CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

ENERGY EFFICIENCY COMMITTEE

JOINT COMMITTEE WORKSHOP

INFORMAL PROCEEDINGS AND PREPARATION OF THE

2003 INTEGRATED ENERGY POLICY REPORT

Docket No. 02-IEP-01

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

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TUESDAY, JUNE 24, 2003

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Reported by

Peter Petty

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A P P E A R A N C E S

COMMITTEE MEMBERS PRESENT

James D. Boyd, Commissioner, IEPR Committee
Co-Chairman

William J. Keese, Commissioner, IEPR Committee
Co-Chairman

John L. Geesman, Commissioner, Renewables
Committee Chairman

STAFF PRESENT

Melissa Jones, Advisor to Commissioner Geesman

Timothy Tutt, Renewable Energy Program

Drake S. Johnson, Power Source Disclosure Program

Pamela Doughman, Renewable Energy Program

George Simons, PIER Renewables Program

Karen Griffin, Integrated Energy Policy Report
Manager

Pierre duVair, Climate Change Program

ALSO PRESENT

Mark J. Skowronski, Solargenix Energy

Thomas Tanton, T2 & Associates

Paul Brophy, EGS, Inc.

Harold M. Romanowitz, Oak Creek Energy Systems

Susan Petty, Black Mountain Technology

Nancy Rader, CalWEA

Robert B. Liden, SES

A P P E A R A N C E S, continued

ALSO PRESENT, continued

Steven Kelly, IEP

Thomas O'Connor, representing Solargenix

Jane Hughes Turnbull, Peninsula Energy Partners

Brian Schumacher, Public Utilities Commission

Jack Pigott, Calpine

Joseph Kloberdanz, Southern California Edison

Hal Verdon, Novi Industries, Inc.

Gregg Morris, Green Power Institute

Lyn Harris Hicks

Antonio Velarde, Southern California Edison

Chifong Thomas, Pacific Gas and Electric

Dave Konwinski, Onsite Power Systems, Inc.

Gary L. Allen, Southern California Edison

Johan Galleberg, California ISO

Doug Wickizer, CA Department of Forestry and Fire Protection

Matt Summers, CA Department of Food and Agriculture

Doug Grandy, CA Department of General Services

I N D E X

P R O C E E D I N G S

CHAIRMAN BOYD: Well, good morning ladies and gentleman. Welcome to the somewhat unique Joint Integrated Energy Policy Report and Renewables Committee Workshop.

I'm Jim Boyd, Commissioner and Chairman of the Integrated Energy Policy Report committee. With me today are Chairman Keese, who is the second member of that Committee, and Commissioner Geesman, who is the Chair of the Renewables Committee.

In a moment I'll throw the mike to them for any opening comments, but let me give everybody a little background on this, and then I will turn the meeting over, after we're done, to Tim Tutt, who's going to be our Moderator today. With Commissioner Geesman is his Advisor, Melissa Jones, and Mike Smith is --he's not out in the audience so --.

In any event, this workshop supports the preparation by this Commission of the 2003 Integrated Energy Policy Report, which Senate Bill 1389, by Senator Boan, last year required the Energy Commission to adopt an Integrated Energy Policy Report every two years with the first

report due to the California Legislature November 1st of this year.

This policy report will be supported by three subordinate reports -- the Electricity and Natural Gas Assessment, the Transportation Fuel Technologies and Infrastructure Assessment, and the Public Interest Energy Strategies Assessment.

The subject matter of this workshop today relates to the Public Interest Energy Strategy's Assessment component of the overall Report. Senate Bill 1038, by Senator Sher in 2002, requires the Energy Commission to submit to the legislature by December 1st of this year a comprehensive renewable electricity generation resource plan, a plan that is referred to as the Renewable Resource Development Report.

It describes the renewable resource potential available in California, along with a plan to achieve the target of increasing the annual amount of electricity generated from renewable resources to equal 17 percent of the total electricity for consumption in California by 2006.

The Renewable Portfolio Standard -- or RPS as we refer to it -- target was modified to 20

percent by 2017 by Senate Bill 1078. And the report will be a technical appendix to the Public Interest Energy Strategies Assessment that the Commission is at present working on.

Senate Bill 1038 also requires the CPUC -- the Public Utilities Commission -- to complete a transmission plan and submit it to the legislature by December 1st of this year. The PUC is directed to use the Renewable Resource Development Report, which will not be completed until December, in preparing its transmission plan.

So we have a tough task of coordination here, to facilitate the coordination of these tasks. The Energy Commission has agreed to prepare a preliminary renewable resource assessment for 2005 through 2008, and deliver it the PUC on July 1st of this year.

The Integrated Energy Policy Report Committee and the Renewables Committee will use information from this workshop, along with input from staff and technical consultants, to revise the preliminary Renewable Resource Assessment, prepare the Renewable Resource Development Report, and prepare the renewable energy portion of the

Public Interest Energy Strategies assessment.

Copies of the workshop notice package and preliminary resource assessment are on the table in the entrance in the back of the Hearing Room. And that package contains today's agenda and specific questions that will be addressed during each section of the workshop.

There are three specific topics on our agenda for today. First, discussion of the preliminary Renewable Resources Assessment -- a lot of tongue twisters in this today. Secondly, the collection of information for the Renewable Resources Development Report. And finally, the discussion of how electricity generated by renewables can play a part in the reduction of greenhouse gases.

With that, I'd like to first ask Commissioner Geesman, Chair of the other committee, at this table today, if he'd like to make any comments. And then we'll ask Chairman Keese, who sits on the committee with me, if he has any final comments. And then we'll let Mr. Tutt moderate the day. Mr. Geesman?

COMMISSIONER GEESMAN: Thank you, Commissioner Boyd. I think the primary thing that

I would say is that this is a tremendous start. I think the staff, in the midst of all the other things they have been doing jointly with the Public Utilities Commission staff in support of the Phase One RPS decision that the Commission adopted last week, has put a lot of effort in this preliminary assessment.

It is a living document in the sense that we still do have a lot of work to do before completing the development report this fall. But it will form a valuable foundation for the Public Utilities Commission staff to work on their transmission plan.

And I think Tim and Drake and the rest of the staff have done a phenomenal job in getting this assessment to where it is now. I've got a lot of questions to raise as we go on, and I'm eager to hear comments from the audience.

I think, as everyone knows, transmission is not something that California has done particularly well in the past, and it will be a vital component to our ability to achieve the RPS goals. The important message, though, that I take from this assessment is that the resource is there, and the resource is likely to be

commercially available within the timeframe.

Not just of our statutory goals, but of the accelerated goals established by the Energy Action Plan. So I salute the good job that the staff has done, and would invite the various public comments that we'll get today. Thank you.

CHAIRMAN BOYD: Thank you. Chairman Keese?

CHAIRMAN KEESE: Yes. This is particularly appropriate that we're having this hearing right here. The next preliminary meeting between the PUC and the Energy Commission and the Power Authority, I believe, is slated for July 17th, in about three weeks.

And as you're aware and was referenced, the Energy Action Plan suggests that, instead of using the 2017 target date, we should try for 2010. And how we do that as we integrate the Energy Commission's roles in the Renewable Portfolio Standard and the PUC's role in Renewable Portfolio Standard will undoubtedly be a subject for discussion in that meeting.

So I hope we can have a full discussion here on all sides of that issue, from the audience and our speakers, to let us know how we should --

whether or how we could implement that accelerated target date. Thank you.

I will say, we can't really tell you -- if you've been at these previous hearings, we've tried to tell the speakers how to handle the system. We're over halfway towards getting a new system. It seems to be working better, but we really don't have any idea exactly how it's going to work.

We think that if you can turn your voice you can still get in, instead of having to speak directly at it. So we'll go through here, we may have a glitch or two today, but the system seems to be getting better, and by next month we're assured it will be perfect. Thank you.

CHAIRMAN BOYD: With that, Mr. Tutt, it's all yours.

MR. TUTT: Welcome, everybody, to the workshop. As technical lead of the Renewable Energy Program I appreciate the kind words from Commissioner Geesman. I want to echo that I believe that the staff has done a phenomenal job on this report.

And I particularly want to say that Pam Doughman and Todd Lieber and Ann Peterson and

Drake have been the main people working on this, and they've just done a fantastic job. So I want to thank them for their work here today.

We have, as the Commissioner said, three topics for this workshop. The first is the preliminary Renewable Resource Assessment. We will take those topics in order.

We will have a short presentation from staff about each topic, and then be happy to have public input, accept questions, answer questions, and so forth, on the topic. I'd like it to be a little informal if we could.

However, it requires -- with the recorder here -- that you come up to the microphone and speak if you're going to provide comment to us today. And we would like you to provide a business card also to the Court Reporter when you do that.

There's material on the back table, an agenda and the report itself and other packages if you haven't gotten it already. And I hope we can have an interesting discussion and get some input that will help us very quickly deliver the preliminary Renewable Resource Assessment, within one week, to the Public Utilities Commission.

So keep your comments a little bit short, because we don't have a lot that we can incorporate in one week. And I would like to introduce Drake Johnson, who's going to do a presentation on the preliminary Renewable Resource Assessment.

MR. JOHNSON: Okay. You can hear me, right? Okay, good, good. I was going to do the same -- acknowledge the same as Tim did -- but it's true, people really put forth a heroic effort. And I need to include -- Xenergy is our consultant on one of the technical issues, and their staff really put in a lot of extra hours at a last-minute time to make sure we could meet this deadline, so thank you to them also.

I kind of want to get this in a right frame-of-mind. This particular assessment that we did is not a resource plan, in the sense of the traditional long-term forecasted resource plan. This is really focused on renewables and transmission.

It's focused primarily on the relationship of renewables with the investor-owned utilities, and the ESP's -- in our report we called them ESP's -- and the community

aggregators, but really are direct access folks, in the old world regime.

And the intent was to try and assess how these folks would meet the requirements of the RPS. So it's a very narrow snapshot.

We looked at three points in time -- 2005, 2008 -- and then there was sort of this beyond question, with the idea that when we do transmission planning with a bigger picture view, where would these things likely develop, and where should we think about having questions like would we put in a double circuit line or a single circuit line, some of that kind of stuff -- in the transmission plan.

Our effort was not to do the transmission plan, but just try and make an assessment of the potential supply of renewables. So I'm going to go briefly over what we've done, because there is a great deal of information in the preliminary information we've done.

We could probably spend a day or two going into all the details of fit, but I think the point is, the objective here was to provide the PUC and the investor-owned utilities and the ISO enough information to do the plan that they're

required to do as part of the order instituting investigation that's going on there.

And they need to get cracking on that. So our objective is to try and make sure that this gets handed to them in a way that we can work with them and continue the process so that we all get done at the end of the year.

And clearly the most important part of today's meeting is feedback from you. We've read it over and over to the point where we don't know we've read it and don't see mistakes.

Just to go over it again -- I've briefly mentioned, here's the objective. We're trying to meet our commitment to the PUC and provide them and the investor-owned utilities, the ISO's, with adequate information. We committed to do these time periods.

We also wanted to do some locational development of where the actual resources might be. And then to assess what this mix of supply would be. I'll get into more details of that as we go forward here.

The approach that we took was to first determine what the energy needs were for the RPS. And in general we did all of our analysis on an

energy basis until we got to the very end, and then converted the energy into megawatts.

That way we didn't have these issues of well, which capacity factor did you use, what sort -- we just stayed all with energy, all the way through our analysis.

And so first we determined the level of need, and then we assessed, in that sense, the existing potential and the proposed and renewable.

So we looked at the state's technical potential, and then divided that up into sort of three categories, which were the existing proposed -- which we'll get back to in a minute on definitions -- and then, after you subtract those two from technical potential you end up with the remaining potential.

And that's where we went with that. We also did an assessment of out-of-state renewables. And I will not spend any time on that today, although what we did find is -- and the reason we did this is because we focused this transmission information on what would be going on instate with instate renewables.

At the time we did this we were still unclear as to exactly how any out-of-state

renewables would be accounted for, and there's probably still some open issues about how that would happen.

But what we did discover in doing this -- and if you read the report -- there is significant, more than significant there is lots and lots and lots of potential renewable resources in the WECC region that could serve us and other states in that region.

And so, in terms of meeting RPS on potential of energy available, I think when you include the WECC clearly there should be no issues that it's a doable item. And after looking at the potential that we had, the next area was to try and develop some plausible resource allocation of the proposed and remaining technical potential.

And now I'll kind of walk you through how we got to the first part, how did we assess the need.

First of all, RPS is clearly an energy planning question issue, it's not this sort of traditional how many megawatts does it take to meet the peak load, it's how much energy does it take to meet the RPS requirement.

And the way we started out with, we took

one of our internal CEC forecasts, and the objective was to determine what the target level -- in other words, what this line was that we needed to achieve.

We knew the end point. This is by definition 20 percent of the 2017 retail sales. We can get into debates about nuances of it, but in general that was the end point.

So what we did was we gleaned through public information that was available -- like FERC form ones, filings that were with the Public Utilities Commission -- and made an assessment of what this baseline number was in 2001. And calculated in that sense a percentage.

We knew how much the renewables were as a percent for each of the investor-owned utilities. And then compared that to an assessment of what the retail sales were, and we got a percentage number there.

so, for example, if a utility was maybe ten percent or 20 percent of their 2001 retail sales came from renewables. And that was our starting point. And the way we made the line grow now was that, in 2003, if it was ten percent in 2001, we said okay, the starting point in 2003

would be one percentage point later, it would be 11 percent.

And with that we took a look to see how this procurement, whatever information we could look at if it was public available, to see how it fit. And that's how we established that. But each year was an increase of one percentage point, to determine this parted line.

And then we determined exactly what would be the allocation for each of the investor-owned utilities. And this information is found in great spreadsheet detail in Appendix A. And that's how we did that.

When we started to assess it also we looked at the utility -- again with what we could find of publicly available information -- if they had achieved greater, in terms of this target line, then under internal procurement they got more.

In the case of San Diego they clearly had, based upon the press releases and that kind of information and data. So we used that assumption in here so you won't see them procuring any additional resources in our plan for 2004, because we felt that they had made it.

Anyway, so that was how we proceeded to develop the need part of it in what we were doing. Then we also checked to see if you were growing at this one percentage point per year growth rate, if out here in 2017 you didn't achieve 20 percent that would have meant you were a little short. So, that happened to be, again, in the case of San Diego that worked out. And what we did is we just prorated the growth rate between those two points a little bit, and increased it a little bit more so that they would reach the 20 percent by 2017.

The world will probably end up different than that, but that was our assumption. Now, I'm going to probably confuse you here because I'm going to switch left and right. So the first thing, this next slide, is cumulative numbers.

These are what would need to be added to cover the investor-owned utilities and the direct access folks by 2005. And then the total, including 2005 plus all the interim years, gets you -- what you would need is 21,200 gigawatt hours of additional energy.

I'll touch on this because I think the graph helps us understand -- we did assume that, in this baseline area, whatever interim was in

here either would be replaced in the process, we did not try to define some kind of decay rate here with an additional growth rate here.

But implicit in our assumptions is that this amount of energy would either continue on -- one way it might be is that existing facilities do efficiency improvements in some way and extend their life and create that. Or that if they were retired or came out of the market they would still be replaced.

But the assumption was that what we would be looking at would be this increment here. And these would still be in the system someplace. But we had no way of knowing how to do that. That's probably a study for another day.

But from a transmission planning perspective that's probably not a bad assumption, because the transmission already exists for this. And we're looking at how much more we need for this here. So these were the cumulative numbers that we came up with.

And when we did our analysis we did assume that this was what each of the utility areas would be to reach their compliance with the RPS rules. We also assumed, when we did our other

analysis that the energy would move from places where the production was to those utilities. And all of it would not have to be sited within this utility service territory.

MR. SKOWRONSKI: Mark Skowronski, Solargenix. Drake, on the community choice aggregator, you've got almost 12 percent shown. What was your estimate of success of AB 117 on that?

MR. JOHNSON: We didn't worry about any -- the assumption was that this load would exist. It would either be a community choice aggregator --

MR. SKOWRONSKI: Oh, I see.

MR. JOHNSON: -- or it would fall back to the utility. So rather than try to get ground up in the details of who's going to win and who's going to lose, we just lumped the two together and figured it would still be the utility's load service territory.

This isn't exactly the same organization that was in our report. But in looking this over I thought that this presentation it might be a little more helpful. What we did here was try and get an assessment of what the potential was, and

the overall technical potential.

And then to segregate that out into the other components which were existing and proposed. But just to give you a sense of what we looked at in terms of technical potential.

The Commission had done -- in the year 2000 we had RAR perform a technical potential study for us, and that was the one we were most comfortable with as sort of our base point. And that's why you see it as sort of our reference. But at the same time we looked at California and also the west, the WECC area, from the renewable energy atlas study of the west, generating solution study, the renewable energy of California study, fuels from the sky, assessment of the available wind and land energy potential in the US -- these were a number of other sources that we used, with Xenergy's help -- to try and get a bandwidth of potential in terms of well, where do we fit in all these different assessments.

Now, one of the things we discovered in looking at these is there's all kinds of different assumptions in them. Some of them assume, for example, you can build something anywhere, in the middle of a national park even. The sun shines

there, so maybe that's a source.

Another case is they've gone and cleaned and said more specifically those aren't the places where you can build, so they narrowed down the potential. Some make other assessments of what's available and how to do that.

But as you can see, there's a very wide range of possible potentials. So given that we had that information we took and looked on a county-by-county basis where the amount of existing facilities, try and identify their location.

Also, this slide actually just picks like the top 19 counties to give you a sense of the existing renewables in these counties. I'll move through these rather quickly. Here is a proposed, I'll talk about that.

In terms of the proposed facilities what we did was we tried to glean information from publicly available sources. One example would be our own, where we have the renewables program here.

We had solicitations three times recently in the last few years for the development of renewable resources. We looked at what was

publicly available in terms of the internal procurement. We looked at solicitations with the SCAPA organization -- that's the Southern California Power Authority.

So wherever we could find that kind of information. We looked at some of the outside ones, BPA had some solicitations, Sierra Pacific in Nevada had done some stuff. So we tried to get a sense of, in the short term i.e. the next few years, what kinds of mixes of resources were people coming forward with and offering to build to meet these proposals.

Now, here again, unfortunately, not all the requests for proposals had the same criteria. So in some cases some recent resource types were excluded. But in general it gave a sense of what was happening here in the state of California in terms of that.

And we used that as sort of a guide in terms of what we might expect to be in the mix of resources that we would see proposed to be built in 2005 and 2008. Certainly what the mix of resources to be built in 2017, I wish I had that because I'd be making some pretty good investments, you know, but unfortunately we won't

know that.

A lot of that will be driven by different market considerations that we probably haven't even thought of yet. But this was the result of what we had seen in proposals of where these resources might be located.

Then what we did was, from the total technical potentials we subtracted from it the existing and proposed that we had identified, and this was what was remaining. Just to sort of see how you rack things up here a little bit, what we did was, this is sort of the resource side.

What we looked at here was the existing renewables that we could identify through our own resource allocations, were credited to the investor-owned utilities and to the direct access people.

One so we could identify what those resources were. This was the remainder of the state. And this was proposed new construction or new forms of resources. And when we compared that to the need, which was -- this is our assumption about the baseline, this is what we saw in the interim procurement, this was the amount we needed to add by 2005, the next increment '08, and the

next increment 2017.

Now how did we arrive at the solution, if you will, a plausible scenario. There's probably as many plausible scenarios as we have people here in the room. So, the way we approached it, one of the things we looked at was the investor-owned utilities.

And I used need along with the direct access need, and we sort of lumped those two together assuming that that requirement would fit within that utility's boundaries. And then we assessed also from that the energy supply for the needs. What potential remaining energy supply there was.

We looked at the proposal, and then the last step after we did all this was to convert it to capacity, through a capacity factor. And once again, we did assume that energy from one source could move from where it was plausibly easy to generate or produce, would move either to that investor-owned utility service territory or out of it into others.

So the next three charts are actually table four, essentially, in our report. We couldn't put them all on one side so what we did

was we looked at, for the case of Pacific Gas & Electric service territory, let's kind of get a sense of, we know what we need for the sum of the investor-owned utilities service territories and their direct access folks.

We have a sense of where projects are likely to be built based on the proposals, and the type of projects that are likely to be built in these time frames. So we started to max that up, to see how we could do it. So this, on an energy basis, is what we came up with for PG&E.

And in fact -- for what we did here, for every one of these sources, we actually could identify at least one proposal that tended to fit in that category. So it isn't like we just looked at this technical potential number and arbitrarily applied it there.

Here is Edison's, I'll make note of this right now. We show there's no remaining potential here, which we have a concern with because we already know that there's a significant amount of interest in building additional resources int he Tehachapi area, and it's at a high enough level that these people have actually come in and met with the transmission planning people.

So we understand that there's upwards of 3,270 megawatts of interest there. This slide only represents about 2,500 megawatts of interest. So I think we'll find out more today on how strong the total number is there.

Then this other category -- like I said, we looked at these 19 counties, but we had a bunch of other resource locations. And in this case, when we looked through them -- one of our assumptions in terms of biomass was that, in general, biomass plants aren't going to be a hundred megawatt or 200 megawatt plant that's going to need heavy transmission.

Chances are they would be spread out throughout a service territory. A small, ten, 15, 20 megawatt kind of a plan. And therefore would probably not be the focus of this kind of a transmission study. Not that they wouldn't need transmission to get there, but they're more than likely to be spread throughout the system.

In the case of Imperial we separated them out rather than lumping them in with Edison's service territory, because they are their own entity. Although they have tremendous potential for geothermal development, and again we assumed

that at least that level of geothermal development would leave Imperial County and go to serve some other investor-owned utility.

And then last but certainly not least is San Diego here. And there's the totals. So that's the way we reached that point. And then the totals add up to what we have there. As you can see, I think what's interesting here is that there's still a remaining potential within the state of some 69,000 gigawatt hours.

These tables are just the previous -- this is our table five broken up. These tables are just the conversion from the energy to the capacity factor using 90 percent for geothermal, 35 percent for wind, and 80 percent for biomass. We converted the energy to megawatts.

Bottom line is everybody wants to know what the megawatts are. The idea was to use just a capacity factor, and there's the total of the megawatts increment needed. So, that concludes my part of it.

If you have any questions, I'd be happy to try and answer them for you. Two things that we included in there, I'd like to just show in addition to that.

As you know, we identified everything by counties, and that was partly because the RER report had great detail about county development. Appendix B, this map, which shows geothermal resources, and intends to show the major areas where these are.

And as I recall reading through one of the ISO's study plan, it sort of implied that if you got within a hundred mile radius of where it was going to go it would probably be okay. So clearly this kind of information you're talking about for Modoc and Siskiyou county we're well within a 20 mile radius of where they might be.

So I think in terms of the sort of the gross level transmission planning, we tried to meet the bill here. These are in the report. All right. So now I guess -- should I stay here for questions, or --?

MR. TUTT: That might be good. You might have to flip back to a slide if somebody has a question about a particular slide. We're ready to take questions. More than just questions, comments, any input that you have for us.

I'll refer you to the notice in the agenda. There's a series of questions. And we

can start off with the first question Please as I said, come up to the podium here to talk if you're going to comment to us.

And the first set of questions refer to the locations that we've assumed in this report for renewable resources. Are the locations that we've included most likely areas of development? Are there other locations that should be included? What are your thoughts or feelings about how we've done that?

I think particularly in relation to the plausible scenario, the tables that Drake showed near the end, where they had -- for PG&E for example, development in Siskiyou, Solano, Modoc, Alameda counties. And also in terms of the potential in different counties. Tom?

MR. TANTON: Good morning, Commissioners, staff. First of all, I'd like to commend the staff for an excellent report. Having done this in the past I --

CHAIRMAN BOYD: Well, it might be nice to tell the audience who you are.

MR. TANTON: Excuse me. Thank you, Jim. Tom Tanton, representing Vulcan Power here today.

MR. TUTT: Tom, can I interrupt you. It

seems that, since we do have this podium set up, it might be reasonable for you to give any input that you have on this one item, as opposed to going questions by question here today?

And then we'll call other people, so that we don't have to go back and forth and back and forth.

MR. TANTON: That's fine. I think, specifically to the question you pose, Vulcan Power is concerned that some important geothermal resource areas have been missed. They're important both in terms of their resource potential as well as the fact they're currently subject of transmission studies, both with PG&E and with Southern California Edison.

We have here today Mr. Paul Brophy to talk about these resource areas a bit. And Mr. Munson, CEO of Vulcan Power, to make some summary comments.

But overall the report is excellent, it's a tremendous first step towards a renewable resource development report, and will provide the CPUC important information as they go through their transmission planning activity.

But we are concerned that, by missing

some resource areas, there's a potential for winners to be selected essentially, unintentionally, by virtue of some getting transmission access through the plan and others not.

So we want to make sure that it is in fact a comprehensive resource assessment. So if we could maybe hear a few words from Paul Brophy on these resource areas?

MR. BROPHY: Yes, I'm Paul Brophy with Geothermal Resources Council and with Vulcan Power. One of my concerns -- it's not really a concern, it's more of a comment and observation -- is that the evaluation of the geothermal resources seems to be confined to those areas that are already either developed or have some sort of geothermal development associated with them.

And it seems that the assumption is being that all future geothermal resources are actually going to come from these areas. I did note you have the new geothermal resources map shown on the screen there. But geothermal resources are always very difficult to evaluate just simply because of the nature of their high upfront costs for discovery.

And what I would like to see is a more thorough technical evaluation -- I don't know how that can be done -- of the future potential geothermal resources.

In the slide that shows the investor-owned utilities, under other wind, other geothermal and other biomass, we see that the future potential for geothermal is probably somewhere in the region of about a tenth of the other two fuel sources.

And that I think comes from the nature of geothermal. I'd like to give an example, and this is an example that Vulcan Power has been working on. One of the largest potential resource areas, although it's not identified on that map, is an area in northern California called Mount Shasta.

Mount Shasta represents a geologic setting that 90 percent of the other geothermal systems around the world are set in. Yet, because only one or two companies have done any work in that area it doesn't show up on the map.

Now, I can understand that between now and 2005 there might be limited opportunities for brand new geothermal resources to be developed

just because of their lead time. But certainly by the time 2008, and definitely by the 2017, I think we can see substantial amount of power generated from areas that are not covered in pink on that map out there.

And the reason why they are not included, as I say, is just simply because of the nature of trying to discover these resources. Basically, in summary, the RPS has given the geothermal industry an opportunity to move forward and do some work on some of the resource areas.

They're not like wind or biomass that can easily be identified. They need lead time to be able to identify them and to be able to demonstrate their existence. And perhaps in the report some more focus can be given onto those potential areas such as Mount Shasta that have a potential for producing large amounts of power, at least within about three or four years time.

And not base the geothermal resource evaluation just purely on expansion of existing projects. Thank you.

MR. TUTT: Thank you, Mr. Brophy. Be assured that this is the preliminary renewable resource assessment, that we will be updating and

looking at potential again for other areas for the renewable resources development report. You might hear more about that this afternoon.

And I'd also like to say that this is the first time that we do this. Surely this will not be the end report on renewables in California. Steve?

MR. MUNSON: Steve Munson, Vulcan Power Company, CEO. We have specific comments more to exact language in this draft report that we would like to see changed. We have expended a great deal of time and money in California and adjacent states to develop baseload geothermal.

On page 18 of the draft report, in the proposed renewable generation section, we believe that you should consider adding Shasta County as a geothermal proposed site in the amount of 240 megawatts. This is based on a number of comments that we submitted in written form to this draft.

It includes the advanced stage of that project in the proposal process to multiple utilities, the signed letters of intent with California Power Authority, and the scope and potential impact of that large resource at Shasta.

It also has to do with transmission.

Transmission is a directly related issue. We have studies underway by PG&E for a constraint removal at Cottonwood that would open up on the order of 240 megawatts of new transmission south, from the Shasta area. So we believe that it's both a resource and a resource-related transmission restraint issue.

We also believe that there are at least 300 megawatts of transmission available from west central Nevada into California into the SCE service territory, based on a transmission constraint study that we have funded with Edison.

And we believe that that at least should be reflected in summary form in this report. The potential for 300 megawatts of baseload geothermal coming into the state as particularly relevant, given the phase one findings, the recent decision.

We also believe that page 19 of the report, also dealing with proposed renewables, should be modified. We would like to see at least 300 megawatts at 95 percent availability added to the nevada chart. In other words, increase the renewables to reflect that constraint removal project.

I think most of us in the room know

about the longstanding constraint removal project north of Lugo, and that's what we're relating to. There is additional line open north of that.

We also believe that the Oregon chart on that same page should be modified as well to reflect the well-known Newberry volcano project in Oregon that has proposed at least 240 megawatt of sales to California. There's rather an easy transmission pathway, there are probably contract issues at COB, of course, that we would have to deal with.

But we can get on to the Lapine substation from that resource site. We ask for those changes in this report before this report is issued in final form.

MR. TUTT: Thank you. You have submitted written comments to that effect on this report, or --?

MR. MUNSON: Yes, we have.

MR. TUTT: Okay, thank you.

MR. MUNSON: Thank you so much.

MR. TUTT: This gentleman here?

MR. ROMANOWITZ: I'm Hal Romanowitz. I'm President of the Kern Wind Energy Association, and also President of Oak Creek Energy Developer.

And, as you know, on the charts Kern county was a substantial resource. And it was clear from the charts that you've done really a quite good job in trying to define things, but were struggling to try and resolve the issues.

And I have put together some information to help you in that respect. And we just filed last night, to the docket office -- and I have copies here that we can pass out so you have additional documentation.

But the Kern County resource, we have gone through and detailed it out step by step. As had been mentioned, there has been very substantial transmission planning that has gone forward in Tehachapi. There has also been very substantial environmental work, so that the core for development is far along in Tehachapi.

so that projects can be done. There has been a significant transmission constraint issue, and we're working to break that down. The Tehachapi area is served primarily by a very weak transmission system which needs badly to be upgraded.

And there is, in addition to that, a secondary transmission of a superior nature,

actually, both witH LADWP and with a private line, one of the two private lines in the state. In the resource numbers that we have put down, for the 2005 period, it will be the existing transmission and maybe a little bit of additional capacity that can be realized.

And that will, we believe, exceed the numbers that you have in your report by a bit. And for 2008 and beyond the numbers are substantially greater. We've documented the numbers in detail.

In the report you show 2,500 megawatts as the potential for Tehachapi, and that is the number of megawatts that were reported in the phase one and phase two SCE transmission conceptual studies. There is an additional 770 megawatts in the phase three conceptual study.

There is 270 megawatts on the LADWP line, and some other small pieces that actually bring the Tehachapi total that is currently in active development, active preparation, that could come to market fairly quickly. It is 4,060 megawatts.

And we have been using for some time the number 4,000 megawatts of wind energy available from the Tehachapi area. So that the two are

actually fairly consistent. All of these projects are identified. They are developers that have put money on the table to have studies done, to have environmental work done, and so on.

So these are real projects, real land identified and so on. So that it's a very significant and viable resource for California. It is located only about 40 miles remote from the Los Angeles Basin, so that there is a need for transmission, but it is really not so remote.

There is, as you know already, 650 megawatts of very successful wind energy developing and has produced from the early 80's in Tehachapi. So the public is exposed, accustomed to the wind turbines, supports it. There is substantial public support. There is substantial political support for the development.

So I think -- we do compliment you on the work that you've done, and I think we can help you resolve with the supplementary information that we've given you you can see specifically where the projects are disclosed. And they have all been disclosed publicly, so that that information is available. Thank you.

MR. TUTT: Thank you.

CHAIRMAN KEESE: May I ask one question here?

MR. TUTT: Yes, I'm sorry. Go ahead.

CHAIRMAN KEESE: Your suggesting that perhaps the number should be greater? Are you suggesting that it's also going to come on faster also?

MR. ROMANOWITZ: Well, I think the total number should be greater, and the potential -- in fact, one additional thing I'll mention here. There's at least a thousand megawatts beyond what is identified in projects now, so that the total resource potential is at least 5,000 megawatts going out into the future.

So it's really double what you have shown.

CHAIRMAN KEESE: And in what time frame are you talking?

MR. ROMANOWITZ: Right. Okay. The 2005 timeframe, because of transmission constraints, I think that the numbers that you have in your report for 2005 are approximately reasonable. They probably should be a little bit larger. Maybe 25 to 50 percent larger, but not dramatically larger.

The 2008 timeframe, you could have easily the 4,000 megawatts available, so that the 2008 timeframe, there's a lot more potential. We are working closely with SCE on the transmission conceptual studies, so that there are viable transmission plans.

Really the issue is how to facilitate and have a rational and orderly expansion program so that you get the transmission available for the area.

There are issues of transmission line. One double circuit line is at least 1,400 megawatts. And individual projects typically are smaller -- you know, 50, 100, 200 megawatts -- so that there's a problem of how you get that first investment going forward. And it's a pretty major issues to help break that loose.

In the hearings that we had a couple of weeks ago at the Public Utility Commission on phase six of the transmission hearing process -- which was on Tehachapi -- we had substantial dialogue on customer reliability issues and we think that there is a very strong justification to do things to help customers as well as to make the renewable supply available.

So there is a mechanism to make things happen near term, but it takes a push. There's been 15 years of inertia, where transmission has been an ongoing problem in Tehachapi, and it has not been broken loose yet.

And I think that, with all of the planning that's going on it's clear that, where you have such a dominant resource, and that transmission is the primary bottleneck, it needs to be a very critical focus on how to get this broken loose and move forward.

And we do have lots of thoughts on the subject, and we can work wit the staff and work with you to help facilitate it, just as we're working with Cal ISO and with Southern California Edison.

MR. TUTT: Hal, can I followup on that?

MR. ROMANOWITZ: Yes.

MR. TUTT: By 2008, you hope for or anticipate a transmission breakthrough or push to get a line built that will allow the 4,000 megawatts of potential to come out of Tehachapi. But will the 4,000 megawatts actually be there by that time, or could they be?

MR. ROMANOWITZ: The 4,000 megawatts

could be there in 2005 if you had transmission. In other words, the environmental work has been done. The resource assessment has been done, and these projects are there. Now the 4,000 megawatts, to get them all by 2005, that's not -- certainly you could get 2,500 megawatts by 2005. Recognize that there's two or three anemometers as a minimum up in Tehachapi. Just tremendous measuring of the data. So that you have bankable resource there. You have a resource that's proven.

And you have a political motivation where the forces of significance in Tehachapi, in Kern County, want to see wind developed. So it's all there. It's really a primary transmission bottleneck is really the thing that's keeping it constrained.

MR. TUTT: Thank you. In the very back?

MS. PETTY: I'm Susan Petty from Black Mountain Technology. And I too would like to comment on how excellent a job this report is, particularly for a first pass. It's really addressed many of the issues, and I think helped us to think about what we mean by potential for renewables.

My comments particularly address the geothermal location and assessment of the amount of potential geothermal power. When we talk about potential renewable energy we have to be precise about what potential means.

Here we've termed this the technical potential, yet I think that in some way we made an economic judgment. We have here the maps and tables, seven counties with geothermal potential and about 11 geothermal sites. In other assessments we see as many as 40 geothermal sites in as many as 14 counties.

I think what may have happened is that we have cut off those geothermal sites which don't have existing development with the idea -- which is probably reasonable -- that the best sites, the ones that are most economic and the ones that will be developed the soonest, are those which already have developments.

But by no means are they all the geothermal sites, nor all those that can be economic. In the recent bids in the Nevada RPS situation, geothermal sites that were undeveloped were bid for power prices as low as four and a half cents a kilowatt hour.

That, I think, brings us to the real issue here, that when we talk about the potential for renewables we are talking about two things. One, the technical potential and the other is the economic potential. By making the decision to include sites that already have development or are close to those that have development we've made an economical judgment.

And one of the ways around this is to take all of the sites, from other studies, and use the information that's available on them to calculate the cost of power from these sites. And this could be done for wind or any of the non-fuel renewables that are tied to a resource as opposed to tied to a fuel cost, and develop supply curves.

Supply curves show a cost of power and an amount of power available at that cost. And that would get us around the problem of making some kind of cutoff and saying this isn't technical feasible, when what we really mean is this is uneconomic right now.

I agree with the person who just talked about the wind situation in Kern County, that transmission is a huge issue. It's a huge issue for geothermal and for wind, because these

renewables are tied to sites, they're tied to specific locations. And if those locations are not right near a transmission line, or don't have good transmission access, it can add enormously to the cost to generate power from these sites.

Studies that I've been involved with show that the cost of 50 miles of transmission line can add from one and a half to two cents a kilowatt hour to the cost of power from a geothermal project, according to land acquisition cost. So it might be useful, if we develop these supply curves, to consider the cost for power for these renewable technologies with and without the transmission cost added for each site.

And this sounds like an enormous task, but in reality it's something that's been undertaken periodically by the Energy Information Agency on a much larger scale than state by state. They do it by the federal regions.

And they have developed models which they update periodically, and are in the cycle of updating right now to use to calculate the cost of power from the different technologies.

And it might be a useful thing to talk to them and use their models to be more specific

in the state of California by costing the sites that we do know of and have information about to get a better idea of what the real potential is but tied to a cost.

MR. TUTT: Thank you, Susan. Nancy and then the gentleman in the back.

MS. RADER: Good morning. Nancy Rader with the California Wind Energy Association. I wanted to echo what was just said. My feeling in reading the report was that the major missing element was any kind of assessment of relative cost.

Both among the resources, and also within the resource, and even within a resource area. So within a resource area there can be different qualities of resource with associated cost. And it's important, I think, to inform the PUC's decisions on credit trading and transmission for them not only to know how much is there but also how much does it cost.

And that's going to be a critical factor in the credit trading decision, and certainly in transmission. So I would agree with the supply curve idea of at least having some relative sense of the cost of generation that's coming out of

these different areas.

My other point is on the issue of the potential in each area. Our feeling is that the San Diego County wind resource that you show in the report is too low by at least a factor of two. That's based on the experience of some of our members and consulting meteorologists in the area.

We feel like it's at least 1,000 megawatts there. And then finally, it's related to the notion that there should be more information on the relative cost of the different resources. I would urge you to reconsider the sort of prejudgment about imposed resource diversity.

I think we need to inform the Commissions about the relative cost of the resources so that will inform whether there should be enforced resource diversity, because it matters how much that diversity costs. So if there's not too much difference in the cost of three resources it makes more sense to have enforced resource diversity.

But if there is a large cost it makes less sense. And one other point I guess is that in addition to information about resource quality

and cost is to know something about the match of the resource to load. We should have that information coming out of the studies that you are shepherding now through UC Davis.

So I think that would also be an important determinate. There is a statement in the report that says that certain technologies match the generation profile of some conventional resources, and therefore they were factored into these scenarios.

But I don't think it's significant that there's a match with conventional resources. What matters is whether there's a match with load. So those are my comments on this topic. Thanks.

COMMISSIONER GEESMAN: Nancy, I'm curious. You've not made any mention of what I actually thought of as the primary missing resource in the report, and that's wind repowering. And I wonder if we aren't all kind of slipping past a rather large, untapped potential resource.

Do you have any sense as to the magnitude of opportunity there?

MS. RADER: We do, and we have calculated the potential for repowers. And I

think that our assessment is that you could add a billion kilowatt hours to the system. And I think our estimate is that we could add 450 megawatts equivalent in increased production within five years.

So thank you for pointing that out. And of course -- except Tehachapi, which I think would require some expansion to get some of that repower potential -- I think there is sufficient transmission potential in Altamount, and perhaps Palm Springs to get some of that out. Buy maybe Hal has more on Tehachapi.

COMMISSIONER GEESMAN: Well, I certainly think, from a transmission planning standpoint -- accessing some of the repowering sites may prove cheaper and faster than some of the new transmission lines that will be required in the Tehachapi area.

I don't want to take away from the priority attached to new transmission in the Tehachapi area, but I also think that it's important from the state's standpoint to proceed as economically rationally as possible, and I'm just puzzled as to why aren't we repowering more of these wind sites now?

MS. RADER: Well, I can tell you why. And that's because there's a provision in the federal production tax credit that prohibits projects from getting a production tax credit unless they get a contract amendment from the utility.

COMMISSIONER GEESMAN: But that's an old provision. I mean, Congress is looking at the law now, aren't they?

MS. RADER: Yes, and they're looking at extending the production tax credit without provision in it.

COMMISSIONER GEESMAN: Why would that make any sense?

MS. RADER: We don't think it does make sense, and we would like to see it removed. And I'd be happy to talk to you about our efforts there. That provision was implemented in 1999. There were roughly 280 megawatts repowered prior to that date, and as soon as that provision was instituted, there have been 11 megawatts repowered.

So it has just brought repowering to a screeching halt, and we would like to see that reversed. We're encouraged by the PUC's statement

in the RPS decision of last week or so that encourages some movement on this issue, but frankly I'm not sure how much movement we can get without removing that federal roadblock.

COMMISSIONER GEESMAN: And what's the cause for the roadblock? I know you can't --.

MS. RADER: Southern California Edison is the one that initiated that provision in 1999.

COMMISSIONER GEESMAN: Manual, could you at some point today address that? Not now, but at some point before we close I would like to continue this dialogue and try to get a better understanding of what might be different now from 1999.

I can think of a number of things that might be different. Thanks, Nancy.

MS. RADER: Thank you very much.

MR. LIDEN: Good morning. My name is Bob Liden, and I'm with Stirling Energy Systems. And we represent some concentrated solar power.

I appreciate the report, and the fact that there's been a clear assessment of the long-term potential for solar, but was a little concerned that, in doing any of the analyses that might lead to transmission feasibility studies and

so on that essentially solar was eliminated from any of the discussions about new resources that might become available over the next 15 years.

And certainly there's a lot of work being done in many states and in many countries to try and bring the cost of solar down, particularly the cost of concentrating the solar-thermal type power down to where it's very competitive with other alternative both renewable and non-renewable resources.

And I would certainly hope, our company is banking on the fact that we're going to be able to do that pretty effectively for the coming decade. And we have several projects that we've been working on.

They are still in the early development stage -- but that might involve both production within the state of California and also neighboring states like Arizona on Indian reservations that are bringing power into the state of California.

So I would hope that in the feasibility studies that are to follow this report that there would be some recognition of the potential of solar.

And it's dismaying in some sense, and it's also reassuring in another sense, that your report shows that, in all of the renewable resources, you can add them all up and they come up to be far more than the total amount of power that we really need in the state of California or even the Southwest -- or in the nation for that matter.

And I would hope that California will continue to take a leadership position in trying to encourage an ever-increasing percentage of renewables as they become feasible both from an economic standpoint as well as a technical standpoint.

So I just want to make sure that you don't leave solar out of the equation somehow simply because there aren't any good projects going on in the development stage right now. There will be, I promise you. Thank you.

MR. JOHNSON: Yes, I guess that's fortunate or unfortunate, I don't know whether that is. But anyway, as shown in our algorithm, we looked for proposals and unfortunately there were no identified proposals.

And then our fundamental thought about

solar in general was that it's sort of spread in smaller units across the state, but that's not true.

A central receiving type of technology, which I think you're speaking to -- and to the extent you can add to the body of our knowledge in terms of if there are geographically more isolated locations where they're more likely to develop as opposed to just sort of this, you know, there's a lot of sun over the state of California concept, that would be helpful.

And then to the extent that you can add sizing and timing relationships then it would certainly help us add more information about the potential.

MR. LIDEN: Very good. I know you cited as one of the sources that you looked at was fuel from the sky report. And that does in fact do an analysis of some of the strongest potential solar sites in California, where they would be.

And they're obviously in the southeastern part of the state for the most part, at least for concentrating solar power. And I'll be glad to try and add some more information for you as well.

CHAIRMAN KEESE: Let me ask -- geothermal is geographically sited, and wind is geographically sited. Are you suggesting that concentrated solar would be that selectively appropriate, or you have an ability to move next to the transmission line?

MR. LIDEN: We have, particularly with the dish technology, which is what our company produces, the ability to scale projects. So they can be very small, 25 kilowatts all the way up to a few megawatts or even hundreds of megawatts.

In this way we can move them to sites that are much closer to local transmission lines and don't require some sort of a massive high capacity transmission line. Other concentrating solar power technologies like trough systems and tower systems do require a somewhat larger size plant and therefore some larger transmission types of requirements.

Having said that, there is within the general technology of solar/thermal as opposed to PV's, more of a need to have a very high direct solar installation type of resource. That is, one where there's less clouds, less diffused light that might come from areas where there's higher

humidity, coastal areas and that type of thing.

So that's why I say that, really, the general sites for concentrating solar power tend to be more in the desert areas of southern and southeastern area, as opposed to up around the San Francisco Bay Area for example or in the northern California areas.

CHAIRMAN KEESE: Right, but it would just seem to me, naively, that as you get started in concentrated solar, that you would have sites that could be pretty close to transmission -- that for that area of renewables, the transmission is not quite as significant as it is for the geothermal and the wind.

MR. LIDEN: That is absolutely correct, sir. And we are looking at doing some smaller-sized projects, even here in the Sacramento area, and in other cities down near southern California main city ares.

Now, our dishes are not -- the 25 KW dish that we have is about 36 feet in diameter. So I don't want to mislead anybody into thinking that this is something that's easily put on somebody's rooftop or in the back yard of their house. It's clearly an industrial-sized thing,

and it does have to deal with these not in my backyard type issues.

It's more specifically designed for remote applications, but there's still a lot of remote applications that are not too far away from population centers in California. So that's certainly an area where we're going to target a lot of our initial builds. Thank you.

MR. TUTT: Thank you. Steve, and then Todd?

MR. KELLY: Steven Kelly with the Independent Energy Producers Association. And I recognize that you have a report that's due in about a week, so I'm actually thinking longer term here in terms of the preliminary assessment and how to make this a better planning tool.

I think you heard some comments today that suggest that, while the technical assessment of what's possible in California and the western region is helpful and informative, it really doesn't take you to the point of being as valuable as you might make your work product.

And I think it gets back to what Commissioner Keese was pointing out, too, that the other dimension is time. We have unlimited

technical potential, but the real question is when can you bring these on, and what's the probability of bringing a project on within the timeframe that you're looking at.

And what I'd recommend doing in terms of future reports is trying to develop more of an analytical rigor about the probability of bringing projects or resource area pockets so that they can serve California consumers.

I'm thinking that the probability of building a project in a state park or a federal park on in a Indian sacred site is a lot less than the probability of bringing a project on that's someplace out of those kinds of locations because they have huge constraints to doing that.

Similarly, in the interim procurement, one of the winning bidders was a project that I believe requires a PUC 851 proceeding, that details an investiture of a utility asset and transfer it over to a non-regulated entity. That is potentially something that will at minimum require a great deal of time, and may not happen at all.

So there are some factors that I think you need to use to shield the scope and scale of

the resource that's out there that could be brought to bear to serve the RPS requirements. It will take us some time to develop what those factors are, but simply a developers proposal, or -- in the lack of some sort of resource assessment behind it -- is in my mind ought not to be sufficient to be included into your report as RPS feasible.

It may be technically feasible. there is a lot of solar out there. There's a lot of wind, there's a lot of geothermal, every technology probably has a lot of potential, but I'm thinking more in terms of RPS potential and being able to bring it on in 2005, 2008 and 2017.

And I think we need to develop some criteria for that. So it's just an observation at this point, and I understand we're not going to be able to make changes for this preliminary assessment. But down the road, it would be very helpful I think.

MR. O'CONNOR: Good morning, Commissioners. Good morning, staff. My name is Tom O'Connor, I'm here on behalf of Solargenix. Joining me is Mark Skowronski. Solargenix is a company specializing in the production of

solar/thermal central plant products and systems primarily.

And we too applaud the staff for assembling a lot of information, trying to synthesize it within a very tight framework, and putting parameters around it on how you implement the RPS.

And our comments are to help to make this document -- even a preliminary report -- a more robust and comprehensive report than it is in its present form. Our specific comments will deal with the draft language.

We have answered some questions regarding the research needs, and we'll defer that discussion until later in the day. But our specific response has to deal with the draft language. We believe, though the intent was there, the report lacks alignment harmony with the very recent CPUC/RPS decision.

Or to use another word that's favored, it's not integrated with that decision. In order to determine the accurate assessment of renewable technologies for the value they currently and potentially provide to California in terms of fulfilling SB 1078 we believe that technology

should be discussed in terms of addressing utilities' load requirements.

And that echoes Nancy's comments that we need to have this report get to the products that utilities are going to be offering -- whether it's baseload, peaking -- as available or firm. And also we ask that the report be harmonized with projected energy demands.

It's very similar to the point I made before. Transmission plane is conducted to assure the development of adequate and reliable infrastructure to meet energy demand.

And I make reference to the California Power Authority's 2002 Energy Resource Investment Plan, "relying on CEC data, projects load growth to increase from 1,000 megawatts to 1,500 megawatts by 2008." The preliminary draft does not assess how the identified technologies can be utilized to meet this projected energy demand.

We also have some concerns about the data and some of the conclusions and assumptions that were used and offered in the report.

On page 11 the draft concludes, and I quote, "while solar/thermal, photovoltaic and other renewable technologies may participate in

future solicitations, they do not appear significantly in the empirical data examined here."

"Based on this information, staff concludes that solar is not likely to provide substantial supply to meet RPS demand in 2005 and 2008."

We believe that statement should be deleted, for several reasons. One, it's inaccurate, it's inappropriate and not consistent with the requirements of SB 1078 to predetermine how the RPS will be met. As previously mentioned, RPS demand will be met through IOU solicitations.

We believe based on product, baseload peaking as available. This statement, and this report, does not recognize that scenario. The statement disregards the value solar/thermal provides as a peaking product.

Furthermore, in the fuel from the sky report that Drake cited, that report projects an increase in energy demand in California of 266,883 gigawatts per hour in 2001, to 337,635 gigawatts per hour in 2010.

Of this increase, the same report forecasts peak demand to increase in California

over this decade from 52,805 gigawatts per hour to 66,804 gigawatts per hour. The draft failed to mention how this increase in peaking demand will be met.

We also disagree with the statement cited above because empirical, relevant data relied upon by staff does in fact indicate that solar/thermal can play a substantial role, providing substantial supply as a peaking product.

We believe that the draft relies on incomplete data to justify not including solar/thermal. In Chapter Three, titled "Existing, Proposed and Potential Renewable Energy Generation In California" the WECC fails to include information available from some of the same resources relied upon by staff mentioned on page 11 on existing, proposed and potential solar/thermal power projects.

Some of the sources cited were CPA Letters of Intent, Southern California Public Power Authority, solicitations to Nevada and Sierra Pacific RFP's, IOU testimony for the CPUC.

And they are addressed in the following way, "with regard to CPA Letters of Intent, nearly two years ago, in the fall of 2001, the CPA, in

one of its first official acts, issued requests for bids for certain renewable technologies. The RFO requested bids for wind, biomass, geothermal."

"In issuing the request for bid, the CPA indicated that the RFB for large-scale solar will be issued later. It did not occur. However, earlier this year Chairman David Freeman, in testimony before the California State Energy and Commerce Committee, advocated the use of solar/thermal as a hedge against the volatility of natural gas supply and prices."

Under the Nevada RPS, Solargenix has recently signed a contract with Sierra Pacific for 50 megawatts of large-scale solar/thermal power to be on line by 2005. And there's an attachment in our written documents that cites a press release.

The SCAPA RFP, Lasher Solargenix -- operating under its former name of Duke Solar -- submitted a bid to SCAPA proposing an 80-megawatt turnkey solar power facility that will begin in 2004, or within 18 months after contract is finalized.

The plant will be located in the Mojave Desert at Harper Lake in two existing 80-megawatt plants. Two options were proposed for electricity

delivery -- to the ISO SP15, or to a tap from the 500 KV Meade/Adelanto line, which runs within two miles of the proposed site.

And also, with respect to the RPS energy requirements cited on pages 8 and 9 of the report, Solargenix recommends that Edison's testimony from the long-term procurement proceeding before the CPUC also be cited and included.

In that proceeding, Edison testified, and I quote, "the objective of its long-term renewable procurement planning program will be to add new renewable capacity equivalent to one percent annually on a megawatt basis of SCE's peak demand, or up to 200 megawatts."

This testimony indicates that Edison will initially use its one percent procurement obligation for addressing its peak demand. And Solargenix is currently in discussions with one California-based investor-owned utility.

We have another concern about some of the text, and it's on page 25. The draft states, "the emphasis of the information regarding technical potential is identification of resources that are geographically concentrated."

The draft further states that, "other

renewable resources, such as solar, will be located throughout the state and will need to be assessed on an individual basis, since they will most likely not create the need for major transmission upgrades themselves."

We respectfully recommend that these statements be modified. The statement is factually inaccurate to the degree it appears to bundle all solar together.

While the placements of PV's, which are distributed in nature, can be and have been located throughout the state, this statement cannot be applied to solar thermal central power plants, as evidenced today by the 354 megawatts of solar thermal power plants located in the Mojave Desert.

CSB plants will be geographically concentrated in various desert areas in California, particularly in southern California, in order to optimize solar radiant availability. And with that I'll conclude my remarks, and I appreciate your attention.

MR. TUTT: Thank you, Tom. The woman right here?

MS. TURNBULL: Chairman, Commissioners,

staff, I'm Jane Turnbull, and I'm here today representing the League of Women Voters of California. I would like to commend the staff on a superb report.

However, there is -- from the League's point of view -- one area which seems to be absent. And that is a comparison of the extent to which distributed resources can displace transmission.

There is a great deal of public resistance to additional transmission out there. And there is a lot of misunderstanding in terms of the need for new transmission. The passage of SB 1078 was hailed as a victory by the green community, the environmentalists out there.

And the vision was solar PV on every roof, and you know, small winds in everybody's backyard. Failing to accept the large renewables out there. And so I too felt that the absences of solar in the report was a real absence.

I also personally, from the other side of my life, felt the absence of biomass digesters was a defined absence.

In both cases, those would be very small-scale, you know, less than five megawatt

contributions. And so, in a sense, when you're dealing with 21,000 megawatts, five or ten megawatts is not going to make a lot of difference.

On the other hand, in the terms of how the public perceives the development of renewables, I think it is valid to include small-scale generation in the package, at least mention of its legitimacy. But also, I would suggest that there be some kind of assessment in there.

And I think supply curves are always a good way to go, to show how distributor generations can fit into the package and to what extend they are going to make a difference. Thank you.

MR. TUTT: Thank you, Jane. I want to assure you that we are engaged in a fairly comprehensive study of the value of renewables in avoiding transmission. And you might hear more about that, if you are able to stay around later today.

George Simons from our PEER department will talk a little bit about that project. We're moving forward on that.

MS. TURNBULL: Good. Thank you.

MR. TUTT: The man in the back corner.

MR. SCHUMACHER: Commissioners and staff, I'm Brian Schumacher from the PUC. My transmission engineers in my group will be working with the ISO and the CEC to develop the transmission plan, which will be in our report required by the legislation.

The first thing I want to do is thank the Energy Commission, and Drake in particular, for developing this report in time to give the utilities and ourselves the time to prepare a report by December 1st. And there's still a lot more work to do with all of these groups.

I just have a few comments. In the draft that we have now, the data in table five -- this is an e-mail that I did send to Drake yesterday -- my comment is simply one of specificity. The work that you've done in four months is terrific.

That said, to the extent that the developments can be identified closer to existing substations it will assist the transmission engineers to develop their transmission plan.

Since we are very close to your June 5th day at this point, I would add that to the extent that

significant changes might be needed or an opportunity to make your report more accurate appears, we would simply ask that you let us know -- and of course the IOU's -- as soon as possible, even as something begins to emerge.

Because -- I'm sure it's clear that once the utilities themselves settle in on certain figures to designed for, that any major changes would be difficult to accommodate.

My only other comment at this point would be to echo one of the earlier speakers with respect to the cost of renewable technologies. Your report of June 5th, I believe, if you were to append that, formally recognize it among the many other reports that the Energy Commission produces, and call attention to it, I know that we'd appreciate it.

And others at the PUC who aren't aware of it would find it useful.

MR. TUTT: Brian, I just want to make it clear, you're referring to the cost of generation report the Energy Commission did?

MR. SCHEIBLE: "Comparative Cost of California Central Station Electricity Generation Technology." June 5th, it's on your website.

MR. TUTT: Thank you. Mark?

MR. SKOWRONSKI: My name is Mark Skowronski, Solargenix. My colleague Todd provided the legal input to the report, and I just have a few generalized comments regarding solar/thermal.

I started in 1989 in the solar industry as a project director for the Solar Two Project, when I was employed by the Southern California Edison company. I got a pretty good feel on both the power tower and the solar pump technologies, both from a technical and economic standpoint.

I'd like to point out -- as Greg pointed out -- there's 354 megawatts of solar trough existing. And the first trough went in in 1981. And in the 20-odd years later, we've made very significant improvements, both in reliability and the economics of building and running a plant.

The cost proposal that we gave to SCAPA in November for an 80-megawatt plant -- price is proprietary, but based on CEC cost estimates in both capitol and the methodology they used, the all-in pricing concept -- we actually were a little bit lower based on the market price reference for combustion turbine running at 25

percent capacity factor.

Based on the assumptions of fuel, and also the fact that we had the advantage of missile financing, which is obviously very significant when you talk about a capitol-intensive technology such as solar/thermal.

The contract we have with Nevada, as Todd points out is 50 megawatts -- we're in discussions with them for another 50 megawatts. We have two square miles at Harper Lake. We have options for land at the old George Air Force Base for additional acreage.

And we're talking to appropriate people in northern California and the San Diego service territory to acquire additional land. As Commissioner Keese pointed out, we are somewhat more flexible than wind or geothermal.

We can move the plant, so to speak, that's closer to a transmission line, which obviously would facilitate the cost, if we just have to reconduct our line or something like that as opposed to going into virgin territory and making transmission.

So, we feel we're cost-competitive. We provide peaking power. We follow the sun. One of

the things we're looking at to enhance the solar technology today is to hybridize ourselves with combined cycle.

If you're familiar with the technology of combined cycle they normally have what they call duct firing. And duct firing is a way you just put fuel in the -- it's kind of like an afterburner -- and you make more steam. And afterburning basically occurs during peak days.

You follow the sun basically with afterburning. And to hybridize a solar plan with a combined cycle basically gives you the best of both worlds. There's a lot of cost synergies, a lot of cost reductions, the economies of scale associated with it.

And I just want you guys to keep an open mind, and hopefully we can include that in the report. Thank you very much.

MR. PIGOTT: Good morning, I'm Jack Pigott with Calpine. And I just had a couple of comments. And they all relate to the geysers. First of all, in the chart that shows existing generation, under Lake County -- and I assume that you mean Lake and Sonoma -- it looks a thousand gigawatt hours a year short.

And I'm wondering, perhaps you haven't included the NCPA plants or --. But based on our current generation levels it looks 1,000 gigawatt hours short. There is potential for additional expansion at the geysers, as I'm sure you're aware.

The geysers is a liquid constrained resource, as opposed to heat. We are about to start the Santa Rosa pipeline. There'll be 11 million gallons a day of water coming in there, and we expect that to have an impact. And on top of that there is additional potential in parts of the field that just haven't been drilled.

The number that I think we gave the governor's office earlier this year, or it might have been last year, was an expansion potential of 200 megawatts, and that's at the expected price levels of some of the other projects that you have included.

CHAIRMAN KEESE: Can you give us a time on both of those?

MR. PIGOTT: Well, the Santa Rosa pipeline is going to become operational in October. And we'll see what happens there with regard to potential expansion. All we need are

the power contracts, and we'll then look probably four years out from there.

So if contracts are available, and I think it's feasible that they could be online in the 2007 or 2008 timeframe. One benefit of the area is that there is plenty of transmissions. It's not constrained.

It was built for 2,000 megawatts, and there's a little under 1,000 there now. The issues, of course, are all a matter of price. If price were no limit I'm sure there's all kinds of expansion capabilities there.

And various constraints and things to look at are expansion of the production tax credit to include geothermal, which is currently in the federal energy bill. There are provisions for royalty relief, and I think that will impact geothermal throughout the state.

And of course the way that your own rules are worked out to see whether any of this generation can compete. I'd be happy to answer any questions.

MR. TUTT: You talked about potential for expansion in the geysers, and if I understand what you're talking about, it's building new

facilities in parts of the field that haven't been developed yet. So that doesn't --

MR. PIGOTT: Well, that is part of it, but you have to remember that -- of all those plants up there we have roughly 2,000 megawatts of plants for 1,000 megawatts of generation. So there is a certain amount that can be gained.

The heat is still there. Drill deeper, inject some of that fluid at depth and find permeability. And we have seen evidence from several wells that it's there, that really the potential is there to -- if price were no object -- to greatly expand the area.

MR. TUTT: Okay. Joe, did you have your hand up?

MR. KLOBERDANZ: Mr. Chairman, Commissioners, Tim Drake, Joe Kloberdanz for San Diego Gas & Electric. Just a few brief comments. First of all, I commend the staff. This is not an easy task, and you're not done yet, but good start.

In particular, for our little corner of the state, SDG&E service area, primarily San Diego County, we think you've got it about right. We see the biomass and the wind additions coming in

based on people that are talking to us, things we hear. It comports more or less with what we think we know about these days, today, that looks like it might happen.

We show in the potential column some biomass amounts. Ms. Rader has mentioned increments of wind potential. Both of those kind of go beyond what we know anything about today, but they're in the potential column. And that's okay.

If they move into the reality column in one of the study years that would be fine too. San Diego welcomes seeing some of the generation coming into its service area. Too little of the renewable actually is showing up in our service area. It will make us more reliant on transmission.

Our transmission planners, therefore, are prepared to develop the transmission plan that the PUC has to develop by December of this year based on what we see in these columns right now. Just one final observation. We've heard a lot of talk today from wind developers, geothermal developers, and even some solar developers talking about the need for transmission. This is not a

transmission-friendly state. That probably comes as no news to any of us in the room.

Some of these facilities might be able to be located closer to existing transmission, but a lot of what we've seen on the maps, a lot of what we've heard talked about today, will not. It has to be where it is. And sometimes there's not enough transmission there.

We're going to need to do something in this state. As someone who is responsible for my company, for getting transmission licensed through the regulatory process, I can tell you we're going to need to do something about that. It doesn't work really well right now.

It's difficult. I'm not blaming anybody. But we're going to have to look at that as a state. Because what we're trying to do on these maps, you can't ignore the transmission aspects of it. Thank you.

COMMISSIONER GEESMAN: I wanted to thank you for your comments, and would encourage you to continue to make those comments about transmission in various forums. I'm actually of the belief that you can blame somebody, and you can blame certain institutions.

And we're probably unlikely to be prodded into fixing the situation before that blame is clearly assigned. I don't think that we serve your ratepayers particularly well in the way that we've approached these questions.

And I think in response to the woman from the League of Woman Voters, in recent years we haven't even gotten to the tough questions on transmission planning. We're yet to get to actual bona fide siting decisions. We've been balled up in need determinations with somewhat bizarre time frames applied to it.

And all of these problems are going to be multiplied when we try to develop renewable resources. So I would thank the gentleman from San Diego Gas & Electric, and encourage you to be a little more pointed next time. Because we need the prodding.

CHAIRMAN KEESE: I will just add that Commissioner Geesman is doing a very good job of starting rocks sliding down the hill. What we need is the landslide. We are seeing movement. At this point I'd say the movement is of the glacial nature, going extremely slowly.

But I think if we can get a mindset

change, which -- I confer with Commissioner Geesman -- if we can change the mindset of how we do transmission planning, I think we can start making significant progress. And at least two of us here are very committed to that.

MR. TUTT: Gentleman over there?

MR. VERDON: Thank you very much. My comments will be brief. Understandably, the report is focused on the more traditional sources for renewable energy, --

MR. TUTT: Could you state your name?

Oh, I'm sorry. Excuse me. My name is Hal Verdon with Novi Industries in San Diego. Wind, solar, geothermal. My question is are you considering outside the box, in the non-traditional areas, in some of the emerging technologies?

Specifically plasma arc waste destruction that utilizes municipal solid waste as a source for conversion efficiently to synthetic gas that would be used in gas turbine generators. It's something that I've gotten rather excited about and have recently become involved in.

It eliminates the problems with municipal landfill toxic emissions, greenhouse gases, the whole recipe. And I would encourage

the Commission to look at that possibility for energy development for California. Thank you.

MR. TUTT: Sir, do you have a business card you can give us?

MR. VERDON: Yes.

MR. TUTT: Go ahead.

MR. MORRIS: Hi, Commissioners and staff. I appreciate the opportunity to make a couple of comments. My name is Gregg Morris, I'm from the Green Power Institute. And I regret that I haven't had enough time to really go through the report in the detail that I'd like to.

But my preliminary observations and concerns are in the following area. And that is, as far as I can tell based on what I have gone through so far, you're using a very low growth rate for electricity.

And I'm concerned in so doing we're underestimating the requirements of what it will take for the state to comply with the RPS. And I just -- for example, in doing projections that I've done, have used the Energy Commissions 2002-2012 electricity outlook report.

And for example, in that report the statewide estimate of retail sales in 2012 is

approximately 327,000 gigawatt hours. And your table, and your appendix, shows only 283,000 gigawatt hours for 2012.

And that's a 16 percent difference. And as far as I can tell -- again I don't know exactly what drives the new projection -- but it looks to be very close to one percent growth rate for the next 15 years in electric demand. And I must say, I sincerely hope that's too low.

Because if that's the case that means our state's going to remain in the economic doldrums for the next 15 years. So that's concern number one.

And concern number two is that you're focused almost exclusively on the IOU's. And indeed you acknowledge that SB 1078 is a statewide mandate. And while a lot of the early implementation focus has been at the CPUC and even here at the CEC on the IOU's, we need to be looking at this from a statewide perspective.

And particular if we do get the REC trading that I think a lot of us expect will happen, it allows the best renewables in the state to serve the whole state. And so I think if you focus only on the IOU's you're kind of forgetting

the fact that we need this other large increment of new renewables as well.

And it all happens together. It doesn't happen as separate chunks or separate processes. So, like I say, at this point my main concern is that we're underestimating the amount of new renewables that are required.

I also see that you're about 15 percent higher than I am on terms of what should be in that baseline. And most of my data -- of your data -- I haven't had a chance yet to figure out where are the discrepancies.

I would request that you consider splitting biomass as you have it now, into two categories -- solid fuel biomass, and gas biomass, which is mainly land fill gas but also does include digesters of various kinds. Thank you.

MR. TUTT: Thank you, Gregg.

CHAIRMAN KEESE: Can I make the observation that that's a net figure. And even if -- you were a little vague on the numbers so I can't respond -- but, one percent growth, maybe two percent growth and one percent efficiency savings.

So the fact that the electricity demand

grows by one percent does not necessarily mean that that's the limit of growth.

MR. MOORE: No, I know. But for example, like I say, your output for --

CHAIRMAN KEESE: If there is a discrepancy that's clear.

MR. TUTT: Is there someone else that wishes to talk about this report today? Yes, ma'am.

(unintelligible question from audience)

In response to that, I started out thinking that maybe we should address question one, perhaps go through question by question, but then I realized that that would require people to come up to the podium several times.

And I suggested that people address all their comments when they step up to the podium on all the questions. If you have comments on some of the other questions feel free to come back up if you missed it the first time.

MS. HICKS: I'm Lyn Harris Hicks from San Clemente in Orange County, and I'm here to express from the standpoint of the homeowner, citizen, active in various organizations.

And my appeal today is that when we are

making a report on the energy futures of California, it gives us an opportunity to do some leadership in guiding the course that we will take in our energy future.

And in this report it appears to me that the assessments and the needs and the hopes -- the hopes are not there as much as they could be.

When I talk with people in my organizations, and my neighbors and friends and family and so forth, I think the general opinion of our citizenry is that we are too much into big installations-type of energy production.

That we need to have a very active energy conservation campaign that is ongoing, not just when we have the threat of blackouts or something. That we need to have a very broad education program for our citizenry. And including our children in our schools in that line.

And that we need to pursue, invest in, the distributive forms of generation. We wonder why we don't have solar rooftop generation on all of the federal buildings and the city buildings and the county buildings and the schools and the industries.

And we think that if that were made a project of the state of California, with investment not only saying we can have rebates and so forth, but pursuing it, going to the big industrial companies and saying we can provide this on your roof and it will provide for you and it will give you security.

Because people are thinking a lot now about security, with the terrorist world now. And it sort of makes obsolete a lot of our planning and thinking that we've gone along with over the years, because the large, the really large nuclear and oil-based generation is target.

And we know it is true. I am particularly concerned because I live two miles from San Onofre. But the homeland defense report, the analysis, stated that nuclear power plants were the most vulnerable targets.

And we're talking now not just about '08 or whatever, but probably for several generations at least. I think it will take us a long time before we solve that problem.

So it looks to me as though -- and I think to most citizens -- that we must begin to rapidly free ourselves from dependence on the oil

and nuclear generation. And the only way that we see that is practical for that is the rooftop solar generation, the wind and the neighborhood type of generation.

With the others of the renewables being very important. But the solar should be the primary thrust. And I'd like to have our state leaders saying that in reports on our energy future. And setting forth a plan to achieve it. The problem right now, in my view, is that we on the local level in the Energy Commission, the PUC, the legislature of the state, are not taking an active role in the legislation that's coming in the Senate of the United States. That energy bill has worked its way through to the point where it's about to be approved. And they'll put as much as 16 or 18 billion dollars into resurrecting the failed nuclear technology.

And that money should be put in rooftop solar generation. And there should be some way that we can change the course that we're on.

MR. TUTT: Thank you, ma'am. Appreciate your comments. Yes, sir?

MR. VELARDE: My name is Antonio Velarde, and I'm with Southern California Edison.

I just would like to commend Drake Johnson and the staff on preparing. An excellent job on these renewable resources.

I have only a few questions, and one of them is they mentioned about Orange County geothermal, and we'd like to know a little more specifics on that, as far as locations. So that we can assess whether we need to look at whether there's going to be a transmission constraints for that, if it ever develops.

There was also some question before on our repowering of wind generation, and I just want to mention that a couple of years ago, even before the passage of AB 1078, we have been working with the Wind Developers Association to develop conceptual transmission studies to integrate.

Initially they had said that they had 1,000 megawatts of wind generation in the area of Tehachapi. And in order to break the circular loop of taking developed generation if there is transmission is that we need to know where they are in order to develop the transmission plans for those.

We agreed to develop conceptual studies, and eventually the thousand megawatts grew to

2,500. And that's what we have developed for the conceptual studies. And we have done a phase two of that in order to determine the environmental requirements for some general routing and general siting of substations.

And we have done some preliminary environmental assessments in these general corridors and general areas. But certainly we still need to do some specific environmental assessments and evaluations in order to file a CPCN.

In the beginning of the wind park development they were using a lot of small units, like 50 kilowatts. It grew to 100, 150 kilowatts, 250 kilowatts. Today they are now installing 1.5 megawatts, or 1,500 kilowatt units, and you can see they are really assured of their technology.

And we have no doubt that they can develop that. The only concern we have is in the conceptual studies we did for these development of transmission plans for the renewable program.

We had asked for interest in developing conceptual studies. And we did get similar amounts of resources, renewable resources, that participated in our studies. Which resulted in

3,270 megawatts for the Tehachapi wind park alone. And today they are talking about 4,000 megawatts, and even 5,000 megawatts.

We surely would like to know right away, sooner than later, whatever the Commission's going to allow to be included in the final report. We did put in some flexibility in our conceptual studies.

We started with 230,000 volt transmission lines for the phase one and phase two conceptual studies for the initial 2,500 megawatts. We also have included an alternative for 500,000 volts of transmission option, in case they do go to 3,270 megawatts.

And I imagine if you go to 4,000 we would have to make some more modifications for that. But we are already preparing to work on the studies in order to confirm our initial conceptual studies to the Commission final report. We have looked at the draft report, and it seems like we do have enough information to start that work.

We will be waiting for the final report to see what the final numbers are going to be.

COMMISSIONER GEESMAN: Are you a transmission planner, sir?

MR. VELARDE: I manage the transmission planning for the internal network.

COMMISSIONER GEESMAN: Do you have a sense of what magnitude of transmission upgrades would be necessary to accommodate repowering at existing wind sites, say in the San Gorgonio area?

MR. VELARDE: Well, today we have about 3,000 kilowatts of actual demand or total output from the wind park. If you consider that we are already planning for 3,270 in the last study that we did, and we will probably be doing studies for 4,000 megawatts if you allow the 4,000.

That should be well within the capability of the system that we will be developing.

COMMISSIONER GEESMAN: Thank you.

MR. ROMANOWITZ: Hal Romanowitz, Kern Wind Energy Association and Oak Creek Energy again. And, since I was up earlier I had talked about the resource, and there were a couple of other points I wanted to make that some people had talked on, but I think that there's some significant input that hasn't been discussed by others.

And one of the critical things that I

think you need to look at as you put together a plan and we figure out how to get renewable energy into the market.

And the big thing is the cost issue. And there is a very major difference in the cost of developing wind projects based upon how the rules are set up in the structure of the program.

For example, if you go from say a 50 megawatt to a 100 megawatt or a 200 megawatt project you maybe are changing the price in the order of a half to three quarters of a cent per kilowatt hour.

When you take a very large resource like Tehachapi, and you look at the very large scale of it, and you combine it with transmission costs, that there is a very significant economic advantage to try and bring forward a very large block of energy. And this can make some very major differences in how much gets developed.

I believe that, if it's done correct, and the market opportunity is allowed to develop, and the rules are set up so that it can develop, you can get a very large amount of wind energy out of a place like Tehachapi that's very, very competitive. It might be the price leader of any

technology.

That wind from a good resource like Tehachapi is inexpensive. And when you facilitate large developments you can drive the cost down, and you can get some great economics that way.

A second point is that the market rules do not foster firming of energy, generally. There is great disincentive, for example, to firming of energy. And our company in particular has been a leader in looking at the issues, working at it.

We have some projects that we believe we will get off the ground in the very near term that will be dramatic, but their scale is going to be limited because the market rules strictly turn it down.

In the interim RPS we were prepared to bid some substantial firmed wind energy projects and couldn't bid them because of the rules. And we ended up just not spinning our wheels and didn't bid. But we had some significant projects to bid and could not do so.

And the disincentive to firming is really substantial. And I believe that there is less of a need for technology development than there is for market development, market

opportunity. That if you can create the opportunity for firming you will get significant firming of wind energy.

And to help SCE in their transmission planning, if you do firming of the wind energy -- like in Tehachapi -- you will find that the existing transmission plans that they're doing will cover the area very nicely.

That firming, in addition to the transmission, will take care of and allow much better utilization of the existing transmission resources.

And the other thing is that, again, if you can combine the repowering with the firming -- again, even a place like Tehachapi could make a pretty significant contribution immediately with the existing transmission.

That there is transmission capacity available in Tehachapi when you allow firming to fit within the matrix.

MR. TUTT: Hal, when you speak of firming, are you talking about storage on site in some fashion?

MR. ROMANOWITZ: Storage on site is the simplest form from a rules standpoint. But the

best firming is where you do it within the geographical region. There are major barriers right now, where you have very tight rules on where you interconnect.

And it makes no difference to the transmission network, but the contractual rules are tight and very strictly enforced. And so it really gives us lots of problems on flexibility, on how we can move things around.

And we have right now 16.6 megawatts of contract capacity that's in limbo just because of these flexibility rules. But there are a lot of other opportunities to firm if you don't have the same point of interconnection.

And specifically in Tehachapi, for example, we have a 500 megawatt storage project that is just sitting essentially dormant because there is no way to physically bring it into the market.

We've looked at pump storage and we have three projects with property that we either own or have tied up. We just can't do them because we have to -- you turn the pumps on, or your generating, and wind is variable, and the two don't mix.

And the rules just totally make it economically non-viable, and it's a major problem. So we're going forward with other storage technologies to do the firming that we will do in the near term, but there are a lot of opportunities where the rules just block it.

And even within, where we can make the technologies work -- we believe within the contractual rules. Edison is just raising all kinds of barriers that say well, it's going to make the energy too expensive when you deliver it on peak.

So they fight it, they make it uncertain, and we have a very hard time taking that crawl step. And the way that you get firming in large scale is crawl and walk, then run.

And the technology is clearly there, we're ready to do it, and we're having a hard time getting these crawl steps. So facilitating the quality of the energy that you need is really an important thing. And that's going to save you a bundle on transmission. It's going to make Edison's job a lot easier.

MR. TUTT: Hal, Thank you. Yes, the lady in the back? Yes, ma'am.

MS. THOMAS: Good morning, Commissioners. I'm Chifong Thomas from Pacific Gas and Electric. I'd just like to make a few comments. First off, it's a very good report, staff did a very good job. And we can use that information to do the transmission studies in conjunction with the ISO and CPUC and the stakeholders and the other utilities.

But it must recognize that, since there are a lot of uncertainties in this report, a reconnaissance type report, and the transmission planning study that comes out cannot be more accurate than the data that goes in. But it will give a general direction of where we're heading on the transmission side, based on this scenario.

It is comforting to know that there are so many renewable resources in the state. PG&E would be, actually we are very happy to see that there are so many renewable resources in the state, so we can meet our obvious goals.

And one thing that needs to be included in the transmission cost is a part of least cost estimate. And it should be included as a total cost of the energy delivered. I have said that the transmission needs to be in place in an

orderly manner, so we wouldn't go on building transmission lines up and down the state.

Timing is very important, it needs to be fit to the timing of the resources, because if you were to build something that turned out to be not needed in the future that certainly is not good for the ratepayers.

So we really would like to encourage the renewables to locate in ares that have less transmission impact. That would be a winning situation for everybody. Thank you.

MR. MUNSON: Steve Munson, Vulcan Power, second set of comments. I'll try to keep them brief, there's a lot of ground to cover. The first issue is the renewable industry, as well as everyone in the room, wants to see a grid that's good for green and good for the grid.

We want to see benefits and upgrades that bring this system into the modern age. The wind industry just made a comment that I totally agree with. We need to do everything that we can to facilitate the quality of this transmission system. Facilitate the quality of the energy.

And that talks about firming up wind and providing baseload. There was, of course, earlier

comments that wind should capture even a larger portion of this market. I note the staff has done a 60 percent wind, 25 percent geothermal, 15 percent biomass mass estimated split on resource type.

I would suggest for consideration that we should certainly not give any larger portion of this market to wind, because we need a grid that works at the end of the day, and that's baseload power.

We have massive quantities of geothermal available, both instate and out-of-state. And we should not create a situation here where we have power that we can't count on. And our company and others certainly have no knock on wind, we need wind.

It's a question of how's the grid going to work. At the end of the day the grid has to work. We would like to point out that there were no questions about transmission asked implicitly, even though the direction of this entire study is to provide input on the transmission system.

We would like to advise the senior members of regulatory bodies here that are not aware of the direction of the transmission docket,

because it hasn't come up yet in formal proceeding, that we have requested as a company that two renewable transmission constraint removal projects get equal footing as we go forward with year with the Tehachapi project.

And we would suggest again that those two constraint renewable projects are essentially north of control, coming down that well-known constraint line in the Mammoth area.

As I mentioned earlier, we believe, based on an SCE preliminary study done for our company, that 300 megawatts of baseload could come down that line. And we would like to suggest that that be a serious consideration as we bring these joint transmission and resource studies together this year.

We also suggest that the well-known constraint north of Cottonwood be similarly treated. 240, 300 megawatts can come down that line of baseload geothermal and baseload biomass. And we ask that these things be mentioned in the report, it's certainly not in the draft.

With respect to the question of where can out-of-state renewables most likely impact this system, just for clarity, again Cobb, 240

megawatts at least from Oregon. The PDCI line intertie could put 250 to 500 megawatts on the PDCI from northern Nevada and impact our system at Sylmar. We believe that should be mentioned.

There's a six million dollar study going forward funded by the CEC now for the muni's, but that line is owned about 45 percent by SCE. So any work done on the Pacific DC Intertie line to provide an interconnect will impact the IOU's and the muni's.

The other obvious interconnect point is Nevada north of control as mentioned. There's a question here about renewable energy credits. Our company and others do not favor renewable energy credits.

The question is how might that impact the development of renewables in this state. We believe it will do two things that are not good for renewables, and not good for California.

The first thing is we believe it will favor wind and will not deal with the quality issue of the power -- the firmness, the baseload power versus intermitteds. We believe that the experience in Texas has been adverse to the renewables industry.

The price of renewable credits are at half a penny or less, and we don't believe that reflects in any way the true attributes and benefits of renewables.

We favor a program that we have testified to in numerous proceedings, under which the attributes could be sold, and could benefit the system. One of the major benefits is that these attributes, as regional and national gas offset emission trading markets open up, as they're starting to do now, those attributes, those gas emission credits could be sold.

And part of that money, maybe all the money, could cycle back to the PGC, to the Public Goods Charge. And that could bring more renewables online over time. We ask that you at least consider this possibility.

That issue relates to question number five, market price reference. We hope during the hearings that are going to be held in the future that we are able to represent the true cost of natural gas in the market price reference model. Because it's very important -- if we don't have a reasonable market price referent base price before the public goods charge is

attached on top, we won't have enough pubic goods charge to meet the goals of the RPS. A very, very, important issue.

We ask that we all bear in mind that there are risks, and that we appear to have reached a new plateau in natural gas prices on average basis going forward in North America. A very serious issue, and it could derail the entire RPS process.

With respect to dates for -- I'm now dealing with question number three, quantity ant technology dates -- I have some suggested changes. We would like to see in your chart on page 31, that deals with scenario by physical location by megawatt.

We would suggest you add in the PG&E sector Shasta County, with 90 megawatts by 208, another 150 by '17. We would suggest that you might add Cobb as a marker for power for Oregon. Put 60 megawatts under '05, 90 megawatts under '08, and another 90 under '17.

We would suggest under SCE we would have some marker for that power coming in north of Mammoth from Nevada, the 300 megawatts. That would show 60 megawatts in '05, 120 in '08,

another 120 by '17.

We would also suggest that you move Mono up, and show 60 megawatts in '05, 120 in '08. With respect to other technologies, that's an open-ended question for us. I tried to put a thinking cap on this morning.

You might consider what zero-emission hydrogen fuels will do to the transmission grid and the growth of renewable power in the state. And if there's a significant growth of the hydrogen market -- particularly in the air polluted urban areas.

The most likely model seems to be rural renewables that produce electricity, which is moved by grid to the service stations in urban areas. That could provide additional development of thousands of megawatts in renewables in this state. Thank you very much for allowing me to speak again.

MR. TUTT: Thank you, Steve. Yes, sir?

MR. KONWINSKI: Good morning. Dave Konwinski with Onsite Power Systems. Morning, Commissioners and staff. I'd like to echo everyone's comments on how great a report this is, how well put together.

Two quick comments. The distributive issue -- I think, like everyone's stating, we should address a little bit more because of the transmission constraints. We are primarily interested in anaerobic digested technologies.

Very easily sitable, easily distributed. They can go to strategic locations. And the amount of biomass available is, I think, greatly understated for the potential of energy that can be produced.

California's Waste Management Board states 15 million tons a year biomass still going to landfills that could be utilized. L.A. Basin has enough green waste collected curbside still going to landfills, which -- about 70 megawatts of power that could be sited.

And we put most of our comments in writing for you to review, but we feel as though there are two points that should be addressed a little bit closer, especially for the transmission constraints. Thank you.

MR. TUTT: Thank you.

CHAIRMAN KEESE: May I ask you a question?

MR. TUTT: Yes.

CHAIRMAN KEESE: In moving towards a renewable portfolio standard, the governor adopted the standard of doubling basically, from 10 percent to 20 percent by the year 2017. And then the legislature adopted the same structure.

And then the Action Plan suggested that we would do our best to accelerate it to 2010. Is it best we deal with that later this afternoon? I haven't heard anybody comment on the realistic nature of any of those terms.

MR. TUTT: I think we can do that later this afternoon. This part was focused on 2005 and 2008, and the renewable resource development report will I think go further, and look at the --

CHAIRMAN KEESE: Can we talk a little bit about that this afternoon?

MR. TUTT: Sure.

CHAIRMAN KEESE: Thank you.

MR. TUTT: Okay. Gary?

MR. ALLEN: Chairman, Commissioners, Tim and Drake. I felt the need to at least have a few comments this morning, based on all of the other discussions that have been occurring. I think Drake and his staff have done a good job of putting together a first cut on the report.

And I guess the sense that I'm having is that we at Edison are trying to maintain some consideration that the ratepayers need to be considered at the forefront of whatever we do in the RPS standard. They will be burdened with whatever costs are set forth here.

Essentially, the ratepayers of California have recently been burdened with a 30-something billion dollar deficit, as well as the ongoing costs of the CDWR contracts. My concern is that the plausible scenario that you raised, Drake, is illustrative of what is possible at any cost.

Not necessarily what can be funded by the existing PGC accounts. And transmission is going to be on top of these funds as well. And this leads into my next subject item, which I think Commissioner Geesman you have focused on.

For the longest time -- and I've been in this area longer than I care to think about now, about 20 years -- we have been tasked by the PUC to ensure ratepayers are getting a fair value or fair benefit out of the existing contracts.

I'm perhaps not the best person at Edison to discuss the repowering, but briefly it

is a ratepayer issue that we're trying to protect. And I know that there are tremendous disagreements between us and the wind industry, and it is the ratepayers that we are trying to maintain at the forefront in that area.

Gregg Morris mentioned that he thought the baseline values were a little overstated. Well, I'll be here to counter that. I think the baseline values -- at least as far as Edison is concerned -- is somewhat understated.

And I would like to work with Drake to try to deal with those issues. And clearly the Commission has set forth, the CPUC has set forth, in their recent decision on RPS, a tremendous amount of work that needs to be undertaken in terms of price reference and etc.

So we will be in there discussing these issues with all of the individuals. And so that still remains an unanswered question about where the market price reference will be, where that will go. So that's somewhat premature to go too far into that. Thank you for your time.

COMMISSIONER GEESMAN: Let me ask you. I don't disagree with your comments from a ratepayer perspective, and certainly the way in

which our staff and the PUC staff have attempted to approach this implementation of SB 1078 I think is quite ratepayer oriented.

You've got a market price referent, and anything above that referent that the utilities would be expected to pay would come from the public goods charge. And it's my understanding that that particular structure was something that your company was quite influential in having written into the bill last year, in order to assure that this was a ratepayer friendly program.

And I think that you were well-motivated to do that. What perplexes me is, with respect to this repowering question on wind sites -- and I don't want to revisit all of the historical stuff, i don't particularly see that as relevant with Congress now taking up really a new bill -- why doesn't it make sense, from the ratepayers standpoint, to make those repowered sites available for the production tax credit?

MR. ALLEN: My response to that is it all depends on how you interrelate the repowered production, with respect to the existing contract.

COMMISSIONER GEESMAN: So it's a PURPA related --?

MR. ALLEN: That's right.

COMMISSIONER GEESMAN: That's helpful. But I would ask you to take back to your company my interest in pursuing this further and higher up, so I have a better understanding as to how the management of the company addresses this in the next context of a Senate energy bill in front of Congress now.

I think it's very important in terms of bolstering the RPS program. As I've said before in a number of different forums, we are not going to achieve these goals without the leadership of your company. It's been very helpful in the past. I certainly anticipate it will be even more helpful in the future.

MR. ALLEN: Just as a very -- I'm not trying to be flip response. If you look at Drake's table, Appendix A. And you look at the percentages that Drake has included on his chart. Our company is at the forefront.

COMMISSIONER GEESMAN: And I've circled those numbers in fact. Because, you know, a lot of the places I go around I get the impression that your company's renewable efforts are headed by Darth Vader. I don't subscribe to that at all.

I think you've done a great job. And I'm sincere in saying that your leadership is going to be necessary for us to accomplish this. And I know at the highest levels of your company there's a real commitment to do that. And I appreciate that.

MR. ALLEN: And we remain committed.

CHAIRMAN KEESE: I heard we're going to save debate on the timeframe until later. Has your company looked at whether we can achieve the Renewable Portfolio Standards goals by 2010? Do you have -- are you going to be able to answer that question?

MR. ALLEN: I'm going to try and hedge as much as I can.

CHAIRMAN KEESE: You can hedge now or later.

MR. ALLEN: We believe we're substantially along the path already. But I haven't looked at it, as far as the state is concerned. So, I think, we have no problem achieving that.

MR. TUTT: Yes, Todd?

MR. O'CONNOR: Good afternoon. Todd O'Connor of Solargenix. And I just want to

address a specific question in your proposal. Question five has to do with the market price referent, and I heard Commissioner Geesman talk about the market price reference.

I think it's important to understand that the development scenario that you propose in the preliminary draft is not accounting for the IOU's coming out with their proposals by product.

There's going to be several price referents, not just one. There will be one for baseload, there will be one for peaking, there will be one for as available, and dispatchable. And then again, that's to determine the amount, if any, of PGC funds will go to supplement the contract.

And for this preliminary report to be harmonized or integrated with the PUC decision I think there has to be some sort of formatting done to the report to recognize that scenario in play. That's all I have to say. Thank you.

MR. TUTT: Tom?

MR. TANTON: I'm still Tom Tanton. One response to a comment made earlier with respect to comparative cost of central station be appended. I think that's a good idea, but with a caution. I

fear that it may damn because of the fallacy of composition, either innovative developers within a region, or specifically cost-effective regions.

The report that sort of presumes a generic cost for the various technologies, and as we know, renewables are perhaps the most diverse in cost by region and developer. One of your specific questions had to do with the barriers to development.

With a bit of institutional memory here, I would refer you to the constraints mapping study that was done a number of times a few years back that identifies things like national forests, tribal lands, etc.

Take out the transmission constraints, because the purpose of the report is to figure out where those are. And maybe update it with some local concerns on land use, such as in Alameda County and what not.

But that's a very ripe report to also refer to.

MR. TUTT: Okay. Thank you. Yes, sir?

MR. GALLEBERG: Commissioners and staff, my name is Johan Galleberg. I'm with California ISO. I'm a grid planning engineer. I would just

like to say two things.

First of all, I would like to commend the staff and Drake Johnson in particular for putting together a very good report. The second thing is just announce that the ISO will be hosting a transmission plan stakeholder meeting on July 7th at 10:00 at the ISO's location in Folsom. Study plans will be presented at that meeting.

MR. TUTT: Anybody else want to talk about the preliminary renewable resource assessment this morning, this afternoon? I suggest we break for lunch, and what time do you want to come back? 1:30, 2:00?

CHAIRMAN BOYD: 1:30.

MR. TUTT: 1:30.

(Off the record.)

CHAIRMAN BOYD: We will reconvene.

MR. TUTT: That sounds good. There's probably a bunch of people standing out in the lobby there, but they'll come in. The second item on our agenda today is the renewable resource development report.

This is the report that's required by SB 1038 to be delivered to the legislature by the end of the year, or earlier than than. Pam Doughman

is going to be providing the staff presentation on the renewable resource development report.

This report will be based on the preliminary renewable resource assessment, include a significant amount of updates and expansions, and be integrated and tied to the IEPR/PIES report. Pam?

MS DOUGHMAN: Okay. For this section of the workshop we're going to actually have two speakers. I'll give you an overview of the renewable resource development report, and then George Simons from the PIER Renewables Program will talk about some work that he has underway.

Let's see -- I'm supposed to change the blinds. Okay? So my name is Pamela Doughman, I work for the Renewable Energy Program.

And I'm going to talk briefly about the legislative requirements, the topics that we're planning to cover in the renewable resource development report, a schedule, and then I'll go over the questions and then we'll move over to George. And then we'll open it up for a discussion.

Okay, the legislative requirements. SB 1038 requires the Energy Commission to prepare and

submit a renewable resource assessment to the legislature by December 1st.

SB 1389 requires an Integrated Energy Policy Report every two years, to be submitted to the Legislature on November 1st. That'll be the first go around. And the renewable resource development report will be a technical appendix to the Public Interest Energy Strategies Report, which is a volume of the Integrated Energy Policy Report.

And we are combining these, linking them, in order to facilitate integration of the various issues. Here are the key themes that we are planning to address in the renewable resource development report.

First we're planning to give a brief history of policy on renewables. Then talk about the renewable portfolio standard, and recent decisions as to how that will be implemented.

Then we will include, discuss, and update the preliminary renewable resource assessment. We'll update the data, including economic potential. And we will include a plausible scenario for out-of-state renewables. We will include international members of the WECC, and potential

resources located in those areas. We will include a discussion of the accelerated RPS scenario, the 20 percent by 2010 that is included in the Energy Action Plan. And we will discuss benefits and barriers to development of renewable resources to meet RPS, or the accelerated RPS.

We will also discuss research on renewables. This provides an overview of the schedule of development of the Renewable Development Resource Report.

Today the goal is to gather input, and on July 25th we will have a staff draft available of the PIES report. And this will include a summary of expected themes and data that will become available in the RRDR.

August 13th, we'll have a committee hearing on the PIES Report. September 30th, the technical appendix, the actual RRDR, will be available for public review. October 22nd, the PIES Report will be adopted at a business meeting, and October 31st the report will be sent to the legislature.

Okay, now these are the questions that were included in the workshop notice. And after you hear George's presentation we open it up for

discussion. If you could focus your comments on the accelerated scenario in particular that would be very helpful.

The first question, to what extent have renewable technologies been incorporated into state and local security plans? What are the benefits and barriers to expanding this application of renewables?

The second question, what can be done to increase the contribution of renewable energy toward mitigating the effects of energy price volatility and price shocks? Which measures provide the benefit balance between benefits, cost, economic efficiency, and equity?

The third question, what are the impacts of renewable energy on California's electricity and natural gas system in relation to the provision of reliable and affordable energy?

The fourth question, on the next page, what are the environmental impacts on public health effects of a major increase in renewable electricity generation technologies? Either the RPS scenario or the accelerated scenario.

And question five, what are the R&D projects that are currently being conducted

related to renewable energy? And which of these efforts look promising in the near term or the longer term? is there research that is needed to further development the renewable energy markets, and what are these research needs?

So that just provides a brief overview of the Renewable Resource Development Report that we will be working on for the next couple of months here, and we welcome you input. But first, let me pass it over to George Simons.

MR. SIMONS: Good afternoon. This morning there were quite a few comments about the accuracy of renewable resource assessments. Some comments about utility load and peak demand. And some of the research work that we've been doing, some of the analysis that we've been doing, will hopefully answer some of those questions.

And this really started off as a project that didn't have anything really to do with the renewable portfolio standard. It started as a project so that we could target research and development in the PIER renewables area.

And it has evolved into a project that we think will be helpful for the RPS. Again, it was geared towards trying to figure out how to

strategically target the development and deployment of renewables in California that would help provide benefits to the electricity system as well as high public benefits, or non-energy benefits.

We looked at grid reliability. We're packaging this material into a geographic information system developed by Department of Forestry. We do resource assessments to evaluate the location and the quantities of the renewables, the quality of the renewables.

And then we also overlay demographic and environmental information. What we do is we look at a series of powerflow simulations for the state from 2003 to 2017 to identify hotspots, whether those are congestion or capacity hotspots.

The datasets that we develop again are the renewable resource locations in the state, and the magnitudes, demographics. We combine that with economic and technical performance data, looking at renewables and then the competition to renewables -- whether that's a T&D upgrade, a recondutoring, or a fossil contribution.

We saw the hotspots by penetration studies and the powerflows generically, so that we

can come up with a solution that isn't driven necessarily by any particular perspective, whether that's renewable or fossil or whatever.

But then we back in to comparing the economics and the performance of renewables against those generic solutions, to see how well they fit. That was how we framed the question of how do we target research and development of renewables for California in the future.

And this is simply an overlay of how you would look at that, with the powerflow studies up at the top, going down into putting them as hotspots into a map, a GIS layer, looking at the solutions and overlaying those with what we call different thematic layers of the public benefits as well as the locations of the renewables.

So along the way we had to update some of the renewable assessments that were done for the state. For example, the last renewable assessment for wind in California was done back in the mid-1980's. It was very difficult to work with that, because it wasn't really an electronic format.

It also wasn't very precise, in terms of location. It was also based on anemometer studies

that were at about 30 feet. That was the status of the technology back in the 1980's.

We recognize that the turbine technology had advanced, so the resource assessment that was done is based on a predictive model that was done by a company called Truewind, based on what's called Mesomap.

They looked at wind power and wind speeds at 30 meters, 50 meters, 70 meters, and 100 meters. What that has done -- and that's on a 200 by 200 meter grid. So we literally have a database of wind potential in this state that has about a billion points in it.

So it gives us a lot of accuracy relative to location of wind quality. We're also updating our assessments on solar, biomass, hydro and small hydro in particular in ocean. Solar and biomass are underway, small hydro is pending. Just to give you some examples of how these things are beginning to look.

There was some discussion this morning about concentrated solar. Well, if you look at the map on the right what you see in fact is there are very specific locations in California where you could use concentrating solar versus if you're

talking about something like flat plate solar, that's the map on the left.

It's much more widely available, much more dispersed resource. Similarly, we subcontracted out through various avenues for additional resource assessments. One of the comments that we saw in was that people were curious about new, or relatively new, geothermal information for California.

Geothermex is a subcontractor to Hetch Hetchy, who we have a large contract with. And they've been updating the geothermal resources in California, as well as the adjacent states. This is a very refined analysis, so they're looking at developed as well as undeveloped resources, and coming up with potential costs for those resources.

So one of the questions this morning was are there going to be supply curves that are going to be developed. Well, yes, you'll be able to get relatively good supply curves out of information like this.

Our powerflow simulations. The powerflow simulations are very extensive. They're done at one line diagram approach, so it's from a

bottoms up. The company doing that is Davis Power Consulting, using a powerful model called Power World.

They're working internally with Commission transmission planners, the electricity analysis office. What they're doing is merging all the cases from the IOU's as well as the cases from the muni's to get a single case for the entire state.

And then they build around that based on projected load from 2003 through 2017. 2005, for example, represents about 6,000 simulations. The results we have to date take us through 2007, so we still have 2009 out to 2017.

I want to spend just a minute on the map here. Some relatively interesting results that we're discovering is that California has both capacity and congestion problems.

Up in the far northern part of the state -- wherever you see those red spots -- is an area where, if you happen to, you really need to add capacity at that point.

The blue spots represent congestion zones, where if in fact you add capacity you make the problem worse. This obviously changes. We've

done this at the 500 kilovolt level all the way down to the 69 KV level.

It changes depending on the voltage you're at, but it also changes as you go out in time. The powerflows, I mentioned that we're coordinating this work internally, they're being reviewed internally.

We still need to integrate the out-of-state transmission studies through a programmatic contract that we have with Hetch Hetchy. A firm called Electronix is looking at the transmission corridors outside California and leading in and what in fact are the transmission constraints and what are our options.

We're also taking this -- there were several comments about distributive generation. Well, we're also going down below the 69 KV level, all the way down to 12 KV. We can't do that for the entire state because the datasets would be just too huge to run.

So we're picking about six different areas throughout the state to do case studies at the 12 KV level, and look at penetration studies of distributive generation renewables.

Again, I want to show you how some of

the GIS information works in conjunction with the power flows. So for example, here's our wind power map that we have of power densities. You can then overlay that transmission distribution system in a thematic layer.

And then on top of that you can also begin to look at these hotspots, and you can begin to say, okay, where's our potential? Now, our potentials by the way don't just look at gross potential. We have gross potential.

We're in the process of developing thematic layers that will give us very specific locational values of technical and economic potentials.

So some of the things that people mentioned today about are you going to try and develop renewables on sacred lands, for example, or in pristine areas. That's part of what would get filtered out in a technical potential.

And again just to show you how we can use some of this information. We're looking just at Forestry at this particular point in time. That's the green resource area throughout the state.

This comes from some very extensive data

that Department of Forestry has developed that takes the information all the way down to the species level and puts it on an acreage basis.

The red triangles represent existing solid fuel biomass plants in California. You can then turn around and look at these relative to what are high wildfire risk areas in the state.

Again, if you're looking at what areas do you reploy renewables first in, you're talking about forestry residues, one of the things you might want to consider is can we actually harvest in areas such that we would reduce wildfire impacts?

And lastly, again, you can take and overlay any number of datasets on top of this. And so what we will have as we develop this report for inclusion into the Renewable Development Report is literally hundreds of thematic layers.

It's really -- thematic layers represent nothing more than data manipulation with a geographical information system.

I want to talk a little bit about the transmission corridor work that's being done by Electronix. This just gives some example of the type of analyses that they're doing.

They're literally looking at what are the transmission corridors? What are the capacities? What can come in from outside the state?

Again, under the Hetch Hetchy contract we're looking at geothermal, wind, and biomass, as well as some solar resources along the Pacific, Sierra Pacific high-voltage DC line. And so the studies are really showing that there are constraints but there are also some very large opportunities.

And again, this is just some example of the types of options that we're considering. This is just one of the, two of the case studies -- manifestation of the case studies being looked at through Davis Power Consulting down at the distributed generation level.

And again, what you do is you begin to do penetration studies into what are the hotspots at the local level.

I want to talk about the strategic values analysis report. Tim provided me an outline for the renewable development report, and I thought that it would be wise of us to try and structure the strategic value analysis report

along the same lines.

So that information developed in the SBA report could be pulled out for use in the developing report. So we're going to look at the electricity situation -- transmission constraints, capacity constraints, as well as peak demand issues.

We're going to look at different scenarios. With the powerflow models we can actually take the straight line approach and look at what that means relative to the electricity system. The strategic value analysis itself lends to solving for electricity problems.

And then we can also look at bulk renewables only. We're doing quite a bit of work at looking at what's the status of technologies, what's the development potential for renewable technologies both on a performance basis -- whether that's efficiency or capacity -- and also what are the economics.

What are the environmental constraints or what's the environmental performance. So we will have chapters in our report that look specifically at each of the renewable resources. Their cost, their technical

performance, the amount of resource, both on a gross, technical, and economic potential, and where those are located.

And then we'll also dovetail that with renewable research efforts that are being developed both within the Commission as well as outside the Commission. And I don't know how you want to handle -- questions now? Or just shift over to --?

MR. TUTT: Yes, I think questions now. If there are any questions related to what we had about the renewable resource development report the questions that were in the agenda notice or the workshop notice or questions on George's or Pam's presentation, feel free to come up and state your question or your comment?

MR. SIMONS: And I will be talking about renewable research technologies in a second presentation on global climate change.

MR. TUTT: Yes, Mark.

MR. SKOWRONSKI: Mark Skowronski, Solargenix. Is this online? I'd like to have a copy of the report.

MR. TUTT: This is a pending or developing report. It's not online yet. It's

something that will be part of or connected to the renewable resource development report that comes over the course of the next four or five months.

MR. SKOWRONSKI: But his presentation. Can we have a copy of his presentation?

MR. SIMONS: I didn't make any copies, but we'll put it up on the website.

MR. SKOWRONSKI: Thanks, George.

MS. TURNBULL: Jane Turnbull. I'm excited. I think that's a beautiful piece of work. As an ex-researcher and GIS fan, it's really thrilling.

But I guess the one question I'd like to ask is that you mentioned that you're assessing the public benefits, and I wondered how that is being done.

MR. SIMONS: We intend to look at environmental characteristics throughout the state as well as demographics with respect to poverty and unemployment. We're going to be looking at things like air quality.

And each of those -- we will value those from some relative basis within what we call a thematic layer. We'll build up all of those, so that as we see a deployment of renewables, where

there's a lot of renewables that can help solve the electricity problem, then it's also does it help solve public benefit, or does it address public benefit issues.

And -- I didn't know, is that answering what your question was, or did you specifically want to know what --?

MS. TURNBULL: That's a big answer, but are there precedents for doing this?

MR. SIMONS: Can we do this? I don't know. It's a lot to bite off, but --.

COMMISSIONER KEESE: Yes, we have a transcript here. Maybe we should be on a microphone if we're going to go back and forth.

MS. TURNBULL: I don't have any more, but you know, are there precedents?

MR. SIMONS: Well, I --

MR. TUTT: The question from the audience was are there precedents to doing this kind of analysis, and Ms. Griffin, of our Electricity Analysis Office?

MS. GRIFFIN: No more. I'm the program manager for the Integrated Energy Policy Report. And the precedent is actually going to be presented at the environmental performance

workshop.

Coming out today is our second environmental performance report, which talks about the environmental impacts of all types of central station generation including renewables. So there are long sections in there on geothermal and wind, as well as the conventional central station, where they look at the impacts on biology, soils, EJ, all of those kinds of things. We've got -- through our siting program -- a fairly well-developed on the environmental and local community impact methodology, which can be adapted and developed and expanded by the work that George's group is doing.

MS. TURNBULL: Can I ask just a followup question? Are you actually assigning costs to that, or are you just looking at the environmental attributes?

MS. GRIFFIN: Just the attributes. It's not a cost assessment.

MS. HICKS: I'm excited about that too. Will there be an opportunity to see a copy of the draft and make comments as an organization?

CHAIRMAN KEESE: Did I hear that it was

coming out today?

MS. GRIFFIN: The environmental performance report draft is being posted on the web today, so all of you who are on the IEPR list serve will get an automatic notification. And the workshop for commenting on it, that public workshop is July 11th.

CHAIRMAN KEESE: 11th is transportation. Probably the 8th.

MS. GRIFFIN: Okay. So it must be the 8th. Municipal resources is the 10th, so July 8th is the workshop for that. And that notice will also be posted today, so you'll be getting an automatic on that.

MS. HICKS: And that is acceptable for us to send written comments?

MS. GRIFFIN: Yes, of course. To the docket, the notice gives you the address to send your written comments to the docket. And if you do have written comments, please follow the instructions and actually send them to the docket, we then have a system for notifying everyone else.

There's a tendency to want to address it to Tim or to one of the Commissioners, and then we all have to run around and make sure that we've

gotten it officially into the docket and officially available for everyone in the public.

So, we appreciate your help on that.

MR. TUTT: And I would add that the Public Interest Energy Strategies report, the PIES report, is also going to be available for public review on July 25th. And the renewable resource development report, which is an appendix to the PIES report, will be available for public review on September 30th.

So there's going to be many opportunities for this information to be -- well, we're going to be further developing it, and then providing opportunities for the interested parties and the public to comment on what we've done. Okay, Todd?

MR. O'CONNOR: Again, this is Todd O'Connor for Solargenix. And my question right now is on process. If I understood your direction correctly, before George gives another segment of his presentation, is this a good time to address some of the questions that were addressed in the notice?

MR. TUTT: Absolutely, yes.

MR. O'CONNOR: Thank you. On your

section regarding integration of renewable resources with the new electricity system, question one, what are the benefits and barriers to expanding this application of renewable energy?

Again, we're here to talk about concentrated solar, I'm here and several others are here to talk about concentrated solar power, or in the old industry known as solar thermal.

We believe the benefits from looking at concentrated solar power include improved system performance and reduced operating costs. As previously testified today, 354 megawatts of said plants continue to operate successfully on the power grid here in California.

Annual operative plans has increased by 35 percent. As plant operations have improved over the last ten years and O&M costs have correspondingly dropped by 40 percent. And these plants have demonstrated the ability of CSP to meet utility requirements.

Concentrated solar power products and systems utilize many of the same technologies and equipment used by conventional central station power plants, simply substituting the concentrated power of the sun for the combustion of fossil fuel

to provide the energy for conversion into electricity.

This evolutionary aspect results in easy integration in today's central station-based electric utility grid. In terms of dispatchable benefits, CSP plans for cost-effective storage or natural gas hybridization can deliver power to the utility grid when their power is most needed, not just when the sun is shining.

The CSP plants peaking capacity routinely approaches 100 percent. And the issue in everybody's mind as we get into an RFP based on a new portfolio standards is cost. And depending on the needs of the utilities and their customers. These existing CSP plants produce power now for as low or maybe even lower now to 12 cents per kilowatt hour, including both capitol and operating costs.

With projected costs as low as five kilowatts per hour within ten years of technology refinements. Economies of scale are implemented as well as some of the financing being paid off up front.

Independent assessments by the World Bank, AB Little, EPRI and others have confirmed

these cost projections. Though not currently the lowest cost for electricity, CSP's is already close, and you've heard testimony today from Mr. Skowronski to being competitive in peaking markets.

And there is significant demand for carbon-free electricity from green sources, even at above market prices. It depends how the REC program is going to be defined here in California. There are several REC programs in the west where CSP can provide value.

And then question two is what can be done to increase the contribution of renewable energy toward mitigating the effects of energy price volatility and potential price shocks?

CSP, through continued research, can be utilized in storage and hybridization applications as I testified a few minutes ago, which can use supplemental fossil fuel firing. And that provides value in the dispatchable power markets.

CSP, either as a peaking product or in tandem with a natural gas power plant, is capable of mitigating the effect of natural gas price and supply volatility, because you have a proven technology out there that can provide peaking.

And that was a big problem a couple of years ago as we all remember.

What are the environmental impacts and public health effects of a major increase in renewable electricity generation technology? CSP plants produce no emissions during solar electricity generation.

While hybrid plants like SEG's do bring gas during hybrid operations for a maximum of 25 percent of their power, newer CSP technologies incorporating storage have the same dispatchability with no fossil fuel usage and zero emissions.

And also there's ongoing research on how to improve the emissions level of these 75 percent/25 percent power plants.

Is there any research and development currently being conducted related to a renewable energy that looks promising for the near term? According to a Department of Energy study conducted by Sargent & Lundy, the DOE has issued a final report on their due diligence review of power, tower and parabolic trough technologies.

And it's on the Sandia website. We've provided in our comments. The report is entitled

"Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts."

It's not the latest Harry Potter book, but it is an important publication nonetheless. The report finds that the two technologies have significant potential for future cost reduction and relatively modest appointment levels. The main hurdle is the implementation of incentives needed to buy down the initial non-cost competitive plants.

In longer term, what are the resource needs? Essentially, looking at the Department of Energy program, we recommend that there are some outreach to go on between DOE and CEC regarding making CSP an integral part of the renewable solar program.

Some of the relevant research needs, we believe, have to do with system validation. Number two, reduce levelized costs for dispatchable and distributed applications, and also look at some other DOE CSP programs.

One in particular is a cost-effective high concentrator PV program, and there are several companies within California who are involved in that even as we speak.

With respect to solar/thermal and Solargenix -- Solargenix, in conjunction with DOE, was responsible for developing and testing and deployment of residential and commercial solar thermal, combining heat and power products providing electric generation and heating and cooling energy for buildings.

This work is being done with major air conditioning companies like Carrier and Trane in the air conditioning, heat engine and electric generator industries.

Solargenix is part of major U.S. universities conducting testing, R&D, and commercialization of products driven by solar/thermal technologies. The most significant challenge in dispatchable applications is that the levelized energy cost is currently higher than competing conventional technologies.

We believe that the DOE program, through technology enhancements, will help reduce the capitol cost of solar components, enable higher annual efficiency both leading to lower levelized energy cost.

There are representatives from other concentrated solar power companies here. One is

Boeing, Mike McDowell is in the audience. The other is Bob Liden who you heard from earlier today, and they can talk more about their programs. But thank you for this opportunity to talk about these programs.

MR. TUTT: Thank you, Todd. Steve?

MR. MUNSON: Steve Munson, Vulcan Power. We all work hard to attempt to integrate these multiple studies into a product which is a stable grid and meeting the RPS objectives. My question is for George.

May we -- you were here today, this morning? May we assume that the constraint removal studies that we talked about earlier will be addressed in your study?

I'm specifically talking about north of control, 300 megawatts, and north of cottonwood. Your green and red dots on the map look very similar to the type of preliminary discussions we've had with the Cottonwood area, for example.

MR. SIMONS: Well, our report will, the powerflow analyses that we're doing we're coordinating with our transmission engineers and our electricity analysis office. They actually are the parties that would be responsible for all

transmission work.

We will feed the results that we get. Our consultants use the assumptions and the framework set up by those folks here within the Commission. All of our assumptions, all of our analyses will be available once the report comes out, but it's really the other offices in the Commission that have the ability on that.

MR. TUTT: And the Public Utilities Commission as well. I presume that your constraint analyses questions will be addressed in one of those places, but we're not the right people to answer the question, I don't think.

We're not doing the transmission planning, we're doing the renewable resources development so there can be a transmission plan.

CHAIRMAN KEESE: But the nature of the report is an integrated report. And we're just talking about a couple of segments here. You can't discuss electricity without talking about natural gas, and this is the first time we're trying to not have an electricity report sitting here and a natural gas report.

Integrate the whole thing. So as we go through the IEPR process, integrated energy, we

will be trying our darndest to bring all of these things together.

MR. MUNSON: May I feedback what I think you said?

CHAIRMAN KEESE: Sure.

MR. MUNSON: Through these multiple processes then, we would hope that the constraint studies would surface and benefit from this system work that is being done.

CHAIRMAN KEESE: When we make policy recommendations that we -- clearly that's part of our target.

CHAIRMAN BOYD: Let me take a try. Are your constraints studies public or available to us?

MR. MUNSON: That's a very good point, thank you. We're going to make them available.

CHAIRMAN BOYD: Can you send me a letter indicating that you have done that, or that you will be doing that? And I'll make certain that it gets to the right person in our transmission staff.

MR. MUNSON: We would be delighted to do that. Thank you.

MR. TUTT: Someone else? Looks like

we've covered the public comment on that part of the agenda. And we can certainly move then, if people are willing, to the third part of our agenda, which is potential measures to reduce greenhouse gas emissions with renewable energy.

And Pierre is going to start that part of the agenda off. There is a list of questions again in the notice to address your attention to these issues. I think we have a few presentations that I'll let Pierre introduce, and start that part of the agenda now.

MR. DUVAIR: Good afternoon, everyone. My name's Pierre duvair. I'm with the Climate Change Program here at the California Energy commission. We've got four speakers for this session this afternoon, and I'm very delighted to have all of them here.

And I'm just going to go ahead and introduce our first speaker, who's going to be Doug Wickizer from the California Department of Forestry & Fire Protection. He's going to talk about biomass in particular for resources in biomass, and how they can relate to ways that the state might reduce it's greenhouse gas emissions.

MR. WICKIZER: Good afternoon. I am

Doug Wickizer. I'm with the California Department of Forestry & Fire Protection. I'm our Chief of Environmental Protection and Regulations, and within that happens to lie forest utilization, which include biomass.

What I'll try to do is just give you a quick overview of what our interest is, if I can figure out how to do this. There we go. Our initial interest in working with the Energy Commission, and inform as many partnerships as we could comes from two primary areas.

As you know, our agency is involved in the resource protection for California. One of the major issues that we face continually in California is of fire protection, and hence the biomass that we have out there in the wildland.

In dealing with our California national fire plan, it's modeled after each other, surprisingly, so they're consistent. Our objectives are reducing the fuel near the homes, providing better protection for the urban interface areas where there's California demographics change.

We are putting a lot more rural development out there in the wildlands. As that

development encroaches we have a larger need to, in our protection arena, to deal with wildland wood waste. We've ended up defining that with the Integrated Waste Management Board as we went along through this.

So we have a need for disposal, and treatment methods that we have right now are burning broadcasts, landfills, open burning, and some biomass to energy, which is an area where we feel there is the greatest benefits.

In that we've worked with the Energy Commission, as George had mentioned, and we've gone a long ways in developing the different types of analysis, we have done GIS-wise, to define what the fire threat is in California.

As you can see, about 48 percent of the state is at high and very high and extreme risk. That's due to the ecology of the different systems out there right now. There was a heavy timber harvesting in the early 50's and the late 1800's that converted the forest types in California more from old growth to young growth, which gives you a higher distribution of ladder fuels, higher risk.

Tonnage per acre probably comes out close. We then took that a step further and took

it into fire-related ecosystem risks. I guess the best current example of that is what's going on in southern California around Lake Arrowhead and Big Bear.

As you're aware, we have quite an effort going on down there right now. 52,000 acres of 80 percent dead trees. I'll show you a picture of that in a little bit. That's a lot of fuel that can be converted to energy.

So it's an opportunity throughout the state to me for us to learn how to better develop the ability to transport and convert that biomass waste into either energy, ethanol, or other minor forest wood products.

The other part, real quickly, to me that we're trying to gain out of this as a department is somewhat of a economic revitalization of rural economy to a certain degree. As you know, due to our forest practice regulations, there are different pressures on the land management of private lands in California.

And shifts in management approaches by the federal landowners, there's been a decrease in the harvest amount in California. What used to be a four to five billion board foot harvest a year

has dropped down to about two billion. There's a similar decrease in the contribution to the economy.

Hopefully, in working landscapes will be, by pushing some value out of the close grown material, the heavy fuel loading that we have out there, we can end up adding to local economies some. To me that's a big opportunity that we have to look forward to as well.

We -- I'm sure you've heard all this before, the difficulties in implementing the fuels is the risk of damage to the homes if we use prescribed fire in those areas. Very tight burning prescriptions. We have air pollution from open burning, and carbon dioxide and landfill issues.

Opportunities for roughly -- if you take the wood waste, forest, and chaparral, the wildlands themselves -- it's about 34 percent of the opportunity. Current forest biomass sources in California -- we run 9 to 20 million acres in chaparral. A lot of that, admittedly, would be very hard to harvest due to steepness and inaccessibility.

But we do have a lot of true forest

lands that are 14 to -- well, roughly 8 million acres in private and 8 million acres in federal ownerships. And you can see the tonnage per acre. Opportunities for reduction. Where we see it is in a couple of different areas.

And this is where climate starts to blend into it. Timber harvest residues -- if modification of harvesting and utilization methods in harvesting processes, such as full tree yarding, if we can get that material into the landings and reduce the transportation cost and provide some opportunity for biofuels or other minor forest products.

The other thing -- that lower picture-- is just to give you an idea of what that Arrowhead thing looks like down there. If you're interested, it's on our website. You can pull up the infrared, and you can see how climate effects when we have a drought move in, how we have an increase in insect population and mortality, and then certainly increased public health and safety risks that go with it.

Woody biomass supply and use -- there's just a quick overview of some information. I think the source was the boss on that one -- oh

no, Bruce Springsteen, okay.

Another map that we brought along worked out with George and the Energy Commission is conversion of live material to bone dry, kind of the opportunities out there across the state by densities. This work will be available in the reports George is referring to.

The barriers that we see that are out there yet from our perspective is transportation is a big one, the efficiencies of the distributed energy equipment that is available right now, and then some of the institutional barriers of grid access, privately-owned utility practices and emission standards.

This panel went through it a little bit earlier, but we have been on board with that all along. And certainly support the concept of renewable portfolio standard. The state of the renewable energy goals right now is that the governor has challenged higher education institutions.

To me, there's a lot of money going into rebuilding infrastructure in the state that would seem to be a good opportunity not only for efficiencies, but for further development of

renewables as we go along in restructuring.

We're trying to consider that. Most of our fire stations are 50 years old. We've been going through a major rebuilding process the last ten years, the last decade or so.

Biomass energy capacity -- you know this better than I -- it's about 685 megawatts. It's in primarily now in somewhat centralized plants that were developed under the incentives you've provided in the past -- the Energy Commission.

We are trying to work towards something we feel is an opportunity for our needs, and that's the distributed generation smaller plants. We're also trying to work along with the folks on the ethanol as a gasoline offshoot unit, and some opportunity for using woody cellulosic biomass, which has somewhat of a greater life cycle benefit than the corn and some of those other vegetative opportunities.

Our specific effort, one that we've worked with George and Val and then a lot of other folks and haven't given up on yet, is we're trying a project of our own specific nature at Washington Bridge, one of our conservation camps.

Our effort is to work with this

partnership, which has been formed over a number of years, to try and develop something specific where we can end up quickly producing something that's roughly ten to 11 percent energy through indirect fire gas turbines.

Producing those values, using about 5 million BTU gasification system. We think that, if we're successful that -- or whoever, we haven't had anyone come forward with a better light bulb yet, as far as something that can be installed on renewables and use biomass out there in a distributed sense.

So we're trying to work with as many folks as we can to try and find out what that might be. And if we can do that, then we have the opportunity to start scattering biomass utilization up and down the Sierra working in conjunction with Waste Management and the Energy Commission.

And a lot of the information that George just gained out of our joint project. Problem, I only put that one little corner down there just to show you that, to me what we found and what the joint agency climate team and working with Mr. Boyd in the past on biomass to a degree, we've all

come up to the conclusion that our best opportunity is a combination of ag, urban, and wildland values, where we can distribute the generation capacity where it can take advantage of somewhat of a middle of the road economics on the three.

Air emissions. Real quickly, the idea on the top is that the biomass energy produces less, has a lower coefficient for putting carbon dioxide into the air then the other means of disposing of forest waste.

We've used -- I think Mr. Morris is in the audience today, he's helped us out with that to make those determinations. Our conclusion is it's bio energy or ashes out there, real simply. There's a stand of trees that's been treated, that's our ideal.

When you run a fire through it that's the way the fire behaves once you treat a stand. If you don't treat a stand in the lower corner is a real small idea of how significant the effects can be.

So I just wanted to put forth where we see benefits coming out of this. It's certainly air quality. The timing of the release -- every

acre in California is going to burn. It's just a matter of when.

And it's the value you can get, it's how severe, and if you can limit the effects of that by reducing the amount of fuels and the intensity of the fires that burn over it. So thank you very much.

CHAIRMAN BOYD: Thank you, Doug. That's a good slide show. You need to show that to more audiences. We've been struggling with this for, what -- four years -- you and I together.

MR. DUVAIR: Next I'd like to introduce Matt Summers. He's going to speak to us about opportunities to utilize biomass in the agricultural sector in ways that might be able to mitigate greenhouse gas emissions.

MR. SUMMERS: Good afternoon, everyone. I've got a real brief presentation here, and sort of going to fill in a sort of general outline that I laid out. And I'm actually not just going to talk about biomass, but all sorts of renewable opportunities in agriculture.

And first, sort of historically, agriculture has been a user of renewable energy. And certainly in the history of agriculture,

humans and draft animals before modern times were the main sources of energy. On agricultural operation about a third of the crop was dedicated to feeding draft animals.

So historically renewable energy has been a part of the system. As time went on, you can see down here, was a very early combine developed in California. In fact, it's the first mechanically driven combine, from Lindsay, California.

And it was propelled by straw fuel that went into a boiler and ran the combine. So there's sort of this transition from a draft animal to sort of a mechanized approach to renewable energy. Certainly, solar energy for crop drying is still a very common practice.

So renewable energy is a part of that system still today. In fact, a lot of energy in agriculture gets spent on drying crops, even though several crops are dried out in the field. And certainly wind energy has always been a part of the system and might be able to be further exploited at this point.

So what are today's renewable energy opportunities for agriculture in our modern world?

First one, up in the right corner there, biomass power production. And scattered throughout the agricultural areas of the central valley we've got these biomass power plants, which sort of are either barely keeping running, you know, on the price of power.

And some of them have shut down. And so there's certainly some issues there. And agriculture would like to see those facilities stay open so that there's alternatives to open burning for agricultural residues. Anaerobic digesters, the centralized systems, are another real good potential to be further exploited.

There's digesters at a lot of food processing facilities, and there's a state program to develop onsite systems for dairies as well. And that's been a real success and hopefully the results of that program will encourage more of that in the future.

So onsite renewable generation. Of course, agriculture occupies quite a bit of land area, so certainly wind and PV systems have a real potential in agriculture. Solar/thermal and solar drying systems have a potential to be further exploited.

And one I like to throw in there too is nutrient management. A lot of energy that's used for agriculture is tied up in fertilizers. And the better we can use the nutrients that come through that system is another way to provide renewable energy.

Maybe not something traditionally people think of because it doesn't involve a power cycle, but it is a way to offset fossil energy in agriculture.

So the benefits and renewables in agriculture. The big one is stabilization and disposal of waste materials. That's your biomass and your anaerobic digester energy systems. Possibly energy cost reduction.

So if you can displace part of your retail cost for power you can, with a lot of renewable systems you can take advantage of that and have a reasonable payback period for your system.

Possible reductions in pollutant emissions. If you're talking about open burning, and you're instead going to run that crop residue through a power plant you're certainly going to offset some emissions, and the same potential for

manure digesters as well to offset some of the emissions that would come from other types of handling the manure.

Reduction in greenhouse gas emissions. Most of the life cycle analysis shows that biomass power is certainly a positive in terms of greenhouse gas emissions. And in terms of rural economic development, like Doug said earlier, that's a real important factor with our rural areas suffering from high unemployment rates and this type of thing.

If we could produce energy in those areas that'll keep jobs here in California, and rural jobs which are real necessary. Key challenges to renewables and agriculture. First of all, it's the cost of energy. If the system cost is higher than other types of energy sources then that's a real challenge we've got to overcome.

And certainly if there's other public benefits it's something we should consider in the equation. Capitol costs of the systems is always a big barrier, particularly for onsite power systems, is getting someone to put forward the upfront cost of the system is a key constraint.

Interconnection for distributor generation. Once again, most of these, like a dairy facility or other facility that's considering their own power system, they are going to need interconnection for reliability.

So that's a key part of the equation, and there's certainly some need to address that issue. System reliability and maintenance and part of the issue is there's not always good information on the longevity of these systems and what it's really going to take to maintain the systems.

And that kind of data -- you know, the state or other agencies supporting developing that kind of data I think is real important. And regional regulatory requirements can be a challenge for these systems.

So some of the policy priorities coming from these challenges would be long-term markets for agricultural biomass. That's a key issue, particularly in the San Joaquin, where they're facing burning phasedowns as the rice industry had to deal with in the upper part of the Sacramento Valley.

A key thing is going to be shore up

markets for agriculture biomass. Incentives for renewable usage is another way, it kind of ties into the first one -- is a way to make renewables a viable alternative.

Fair interconnection and rate policies. That's going to be really key here. We're seeing that with the state SP5X program. It's getting a policy that can help interconnection happen, and a rate policy that makes that sort of a viable alternative to an onsite power provider.

Other regulatory barriers. Some certainly should be n place and shouldn't be removed. I've kind of changed my language here a little bit, but there are some barriers that are artificial at a regional level, and a lot of them stem from there not being a lot of knowledge at a local level on how these systems work and what the impact is going to be.

And certainly things like the California Environmental Quality Act and those sorts of things can sometimes be a barrier to adopting new systems. System reliability testing and new technology development, as I discussed earlier, are key factors as well on the policy level.

And I'm going to leave it at that, and

this is my contact information. Thank you.

MR. DUVAIR: Thank you, Matt. I'd just like everyone to know we do have presentations. These slides are out on the front table from the first three speakers, and we'll have all the presentation up on the IEPR website under the renewables section.

Our next speaker is Doug Grandy, from the Department of General Services.

MR. GRANDY: Okay, as Pierre said, I'm with the Department of General Services. I spent about 20 years over there running a group that did energy project development in state facilities, and the last couple of years I've been loaned out to the governor's office of planning and research doing policy analysis and formulation on various topics in energy and the environment. So that's kind of where I'm coming from. That works, that's a relief. I hate to be trapped back here, you know. What a relief.

So I'm going to talk about promoting public agency purchases of renewable power. What are the roles of government. And I'm going to look at why would you consider such a thing. How would you bring it about. And then if you're

successful -- I've got some results from some studies that happened last year or so that should be interesting.

Okay, purposes, the why part. This first one, reduced cost, I pulled that off a solicitation that came out of General Services briefly, so I felt I had to put that up there. Frankly, I will discount this one right off the bat, because I don't think reduced cost is one of the main purposes.

We want to reduce cost in government -- we probably have other ways that would be more effective in doing that other than chasing emerging technologies. So, with that said, reducing demand I think is an extremely viable purpose, as well as increasing security and liability.

This is a distributed generation benefit. Having a source of generation onsite. Particularly exciting to security interests within the state, computer systems, people who need premium power.

Expanding employment of emerging technology. Well, clearly, I think that's a public purpose that government can step up to

helping out.

Providing mechanisms for performing the operation that venture capitalists like to refer to as crossing the chasm, you know, getting from RD&D and commercial development. I think the government can serve a vital role in dragging technologies across the chasm.

Altering the marketplace. Very definitely. By making some of the early purchases as technologies are approaching the chasm or stepping into the void, government can play a key role there.

Leading by example. This is a phrase that the governor's used on a number of occasions. I think it's perfectly apropos here.

Reflecting the values of its constituencies. And here, in the context of renewable energy, I think of concepts like environmental externalities.

And somebody already mentioned attributes such as security, liability, energy independence, etc. Attributes that don't find their way into the project budget. So it's a plethora of issues that are value-driven.

Improved credibility. I think the

government serves a great role by using these technologies. It says to the public at large yes, these are very credible things. And gosh, if the government is using it, it must be good.

So as much as people complain about government, we do carry a lot of credibility when we finally do something. The due process we go through in public works, by the time we get done, most everybody agrees it was a good thing.

Hedging risk. This can refer to supply risks as we already mentioned, but also price volatility risks. There are many cases where public agency folks, in their budgeting exercises, like to bring a budget in on time.

They're not so much worried about it being high or low or saving money. It's an important issue in the public sector that a lot of folks really don't understand that people who are running facilities -- facilities managers -- in the public sector don't get a lot of accolades if they bring in the energy bill under budget at the end of the year.

But they'll sure get beat up if it comes in over. And if the costs are volatile, that's just a nightmare to them. They have a built-in

incentive to bring it in on budget.

So what are some of the potential roles government can serve? Well, finance. There are plenty of sources of financing available today. The Power Authority is the big kid on the block, they have $5 billion of revenue bond authority.

But there's others as well. My own department, General Services, they've got $250 million. The California Alternative Energy and Advanced Transportation Finance Authority, or CAEATFA to its friends, has $350 million in revenue bonds available.

And there's some other things around, like SIDFAC has industrial development bonds. The Power Authority can also issue industrial development bonds. There's a number of financing mechanisms around that are available for renewables.

Aggregators. This can be both as a seller, which the Power Authority is working on, or as a purchaser, which we had to do last year.

Developer. Kind of what I did for a lot of years. Go out and develop projects. Who's going to be the driving force behind getting these projects done. You can't depend on people running

the facilities to do that.

Yes, there will be vanguards out there, but by and large you have to kind of look at the middle of the curve. And what are those people doing? Well, they're running buildings. They're responding to the complaints of the tenants.

That's their job. It's not your mission. Their mission is to keep the tenants happy. And so someone has to take that developer role. And that is something that government can definitely do.

Procurer. In the sense of mass procurement. Hopefully, by aggregating demand for products and services you can get volume discounts on things and have a beneficial effect on pricing, therefore helping the deployment of technologies.

Consumer protection. That's, I think, pretty obvious. That's a government role almost exclusively. Although there are private organizations like, say, Better Business Bureau and Chambers of Commerce that serve a valuable purpose here as well.

Tax preferences. Certainly something that government at all levels has hit pretty hard in this area. Regulatory treatment, a lot of

people have talked about.

Research and development. That's another important role of the government is to keep development flowing into R&D. They also serve as a user, providing the host sites. We like to be guinea pigs for interesting, exciting technologies that come on.

We offer good test sites. And an important feature here is that the information that is developed in those kinds of settings is public information.

If you try and do an experiment with an emergent technology at a private facility often you end up with a lot of proprietary information that may be helpful.

We have to be very careful about how we use government money that way. We want the results to be generally available, so government sites are very good.

Plus, often these end up being universities, where you have all this brainpower around, and all this parallel research going on that is enhanced by having the project onsite.

Information dissemination. This is not just a credibility enhancing function, but getting

the word out about technologies that need to be encouraged. It just makes technologies more accessible to the public generally if they can go to a website and find information.

I think one of the best examples there is, the local government commission has a website they call SPIRE, and if you haven't seen this you ought to check it out.

It's an excellent example of how information dissemination makes technologies more accessible to the customers. Because their customers are cities and counties, so it's oriented toward a municipal customer.

So then, what are some of the mechanisms available to bring about deployment of renewable technologies. Capital outlay project -- that's kind of the obvious one. That's -- well, the SB5X approach. General Services got $40 million to go out and just build energy projects -- energy efficiency and renewables.

For example, a 450 kilowatt PV system on the top of the Franchise Tax Board, just a couple miles down Highway 50 from here. That's a lot of heavy lifting, to put out budget dollars to pay for technologies that are marginally cost-

effective, as a way of looking at that issue. But it certainly is on the top of the list there.

Tax exempt-financing is what I listed off those other sources before. The revenue bonds, that's tax-exempt revenue bonds. So those bonds are sold at the marketplace. The holders of those bonds don't pay taxes on the returns.

Therefore they get a lower rate of interest. And then government raises money with lower interest rates. It's a good deal. It takes a couple of percentage points out of the cost of the project. But it has to be for a public purpose. So we need a public agency to build the public up.

Bulk procurement. I touched on a bit ago. And I will come back to bulk procurement. I'll talk about some work that went on at the Power Authority last year, as we did some bulk procurement, or took a shot at it anyway.

Other financing. I will just throw lots of things into that bucket -- rebates, third party financing -- just about anything else you might think of.

And the zero profit note there is the idea that, let's say in a third party finance

situation, a project may be an easier sell to a public agency because at the end of the day we don't really have to turn a profit on them.

If our real purpose is to develop an emerging technology, we'd be happy with a break-even proposition as long as there's no prospect of us going over the edge. That's not good, that's never good, heads will roll.

But as long as we can kind of hold the line on that we will tolerate zero profit scenarios, which makes public agencies a tool that adds a couple points to the project value.

Risk management. Again, this is about supply and cost risk, but just taking a perspective of risk management, a facility manager may find him or herself in a position of saying okay to a project that actually costs more than the otherwise applicable rate because it provides a premium power source. Again, this is the distributed generation benefit, primarily.

So this is a chart, let me show you real quickly what's going on here. This was some work at the Power Authority last year, when they went out to bid for three different technologies -- fuel cells, photovoltaics, and CHP -- and these

are some of the results.

This happened to be a fuel cell company -- I know I've been talking about renewables and this is a fuel cell and I do know the difference, we can argue about that later.

This particular technology illustrates the point I want to make very well, and then I'll apply that same point to what we got on the solar bids. So this was the pricing that they gave us by each of the years.

And so you can see, up here in the first year, if you just went to buy this product you'd be in trouble, that's $12,000 per KW. So you'd have to have some serious, compelling reason why you wanted to spend that much when you can probably go out in the marketplace today and get, you know, a gas turbine for somewhere down around where -- got the light -- right here.

Now these are more efficient than a gas turbine or any kind of precipitating engine thing. So let's say the break point is about $2,000 per KW, the point at which this stuff would survive on its own in the marketplace.

So everything below this line is kind of cost-effective on its own. That kind of leaves us

with this area within this triangular shape here that is early production of these units that needs to be paid for in some way.

If that can be accomplished then we turn loose on the world, you know, 2,000 per KW fuel cells that get about 55 percent efficiency, from fuel to electricity. That's a pretty good deal. And we will have accomplished a wonderful purpose in developing this technology.

This whole area here only managed about six megawatts. You know, that's a lot, but it could be worse. And only cost about 18 million. Now if this was a large mass procurement and we were buying more than just this much production -- and by the way, you can't tell from this chart, it doesn't tell you anything about volume. The volume of units was much higher out here than it was back here. This is just a handful of units. Only the cost was high.

And so the total cost of that was only 18 million. An average price of around 3,000 KW. And so if you buy enough units you get further out here and you push down the average cost, and you can more likely place these in those niche markets where these come up. Through the vastness of

government.

Okay, so that's the concept of the mass procurement. But a fuel in development, dilute it over a larger purchase, and get the cost down for everybody.

Now here's what happened in solar. This chart's a little goofy on purpose. Actually, these are all the solar bids as they came in. These squares show what the average is. Some of these actually went up with time. Go figure.

These folks were strongly encouraged to show us forward pricing. But when we got -- so, that's just to show you how goofy the stuff is in reality. But if we look at just the bid that's down here -- and by the way, this company is now out of business, and so is the fuel cell company. These are some of the reality challenges of trying to do good in the world, too.

It still makes an interesting case study. If I showed you this chart first it would be hard to grasp the concept that I showed on the fuel cell chart. But the idea's the same here. At 2,000 KW, or as the solar guys like to say, $2 a watt.

Let's just say, for the sake of

argument, that this technology becomes cost-effective and flies off the shelf, and there's nothing more we need to do to encourage it. So, you can see, the slope here is not nearly as good.

This one flattened out, that was due to the bidding process. They would have given us a price down here. In fact, had we had the opportunity, we could have hammered these guys down to something more like starting here, and brought it down there.

That was also an artifact of the bidding process, it was too vague, and the information given out didn't have sites.

This total cost is more like 72 million, and it's 14 megawatts. So that's a little steeper hill to climb in terms of the mass purpose exercise. So there's a little work to go. The good news is, and probably most of you are aware that the Power Authority is working on another version of this.

There's nothing that's been formally announced yet, but it's been informally announced a couple of times that I heard that we would now expect to get prices starting here in the 375 range, and I have been told by manufacturers in

Japan that we can expect a price point that is out about where my dot is here.

$2 a watt in 2010. And that's an exciting price point, if we can get to that. That unleashes the stuff on the world.

So what happens. Now this is some work that came from a study group that met at OPR, mostly over last summer. And this particular model here was largely put together by Gregg Morris, who's in the audience, from the Green Power Institute. And supported by the National Renewable Energy laboratory.

This looks at the different renewable technologies, and what happens in various RPS scenarios. This particular scenario here is kind of a base case of 20 percent in 2017.

And so here we can see geothermal -- I'm sorry, on the copies yellow didn't copy -- you can see geothermal and wind rise up the fastest. They're well-established, lots of resource, they get moving real quickly.

And all these other technologies, the biomass and etc -- and these two right here I actually want to bring your attention to. This is actually an exponential growth curve.

It starts at such a low, low, rate for both solar/thermal and PV that students of mathematics would realize that, yes, that's exponential growth. Let it go for a few years and see what happens. It truncates upwards.

So then we asked what happens if you pulled out all the stops. Because what the model does, and I think this is additive to the work that is going on at the Energy Commission and I hope you all will embrace this and incorporate it.

This looks at how would these businesses grow if the environment in which they live were altered in some way. We can model different scenarios of what happens to these businesses. We do all these things to incentivise and de-incentivise certain behaviors.

So then what happens to these industries. And that's what we're plotting over the years, in terms of megawatts. So then what happens if there are no constraints? We don't have business growth problems, we don't have anything except limitations of the resource itself.

Well, then this in on about the same scale. Before we were on this zone with

geothermal. The interesting things are up here, because geothermal has crested. It has hit its resource limitation up here. And wind is about to do the same. Not that we run out of wind, but there's real estate accessibility issues that are kicking in in a big way.

And then the thought I want to leave you with here is to look at the solar, what happens here. It still concaves upwards and growing exponentially,but out of all of these resources, This scenario gets us to 32 percent by 2017.

This is what could take us up to the 100 percent scenario. And that's off the chart data-wise. A little factoid I will leave you with is, if one-half of one percent of the surface area of California were covered in PV, not especially efficient PV, just ordinary stuff, it would equal the heat demand of the state. One-half of one percent.

Now, to be fair, that's a square 30 miles on the side. And that's a hundred billion dollar undertaking. But, you know, just to kind of put that in perspective. And with that, I'll close.

MR. DUVAIR: Thank you very

much, Doug. Well, one of the things that I've seen through the first three speakers is that renewable technology is going to be the key to progress in all of the ares for biomass and PV and with the agriculture use.

And so we've got George Simons from the Energy Commission is going to speak to us about renewable technologies.

MR. SIMONS: We've got a fairly large portfolio of renewable technologies, so this is a scattering -- wait, wrong presentation. Let's go back. Okay, that looks a little bit better.

So I wanted to focus primarily on renewable technologies that would impact global climate change. And really, when you start talking about renewables and global climate change, renewables can impact global climate change in two ways.

They can either impact them directly by reducing methane or impacting carbon dioxide. Or they can impact them indirectly by displacing a fossil fuel, which would be a contributor to carbon dioxide.

So if you begin looking at renewable technologies, the biggest impact on methane

emissions is really landfills in California and livestock manure.

It turns out that enteric fermentation, or gas from cows, is a fairly large contributor also. But we don't really know how to get a handle on that one right now.

But, again, it's fairly large sources. There's over 300 active landfills in California, there's over 2,100 dairies. So it quickly becomes a question of size. And literally, inversely, a size question.

These are not going to be large power plants. There's going to be a lot of small power plants. There might be some centralized power plants. But because of the nature of the resource they tend to be more distributive.

Carbon dioxide emissions. It turns out that forestry, actually, is a big sink for carbon dioxide. So what we want to do is maintain or increase the potential to have a sink. And you do that by reducing wildfires and open field burning emissions.

And then I'm going to finally talk about what types of renewable technology developments that would act as an indirect reduction of fossil

fuel combustion. And so if you're looking at landfill gas the biggest issues facing further development of landfill gas energy is primarily one of cost.

It takes on the average of about 50 years to get gas out of a landfill. Even though it's not a highly capital-intensive prospect, nonetheless because of the large amount of time in recovering the gas it becomes a cost prohibitive venture for most entities.

So we're really looking at some research that has been developed by Yolo County. We funded that research from early on, on accelerated decomposition, or what's termed bioreactors. And what that does is essentially reduce the timeframe of getting the organic matter turned into methane by about a third.

So, instead of a 50 year lifetime to recover gas you're down to essentially ten or 15 years. So you accelerate the methane capture, you increase your cost-effectiveness. But also because in fact you're converting at a higher rate you compress the amount of space in the landfill.

Which is a big benefit to municipalities, because siting an additional

landfills is a real problem anywhere you're located. Yolo developed a control cell under an earlier R&D program, and we built off of that, under PIER renewables.

And we're now going to the next step. We're looking at how can you take what was a very much an R&D effort and mainstream it. So we're working with CH2 and Commonwealth Energy looking at how do you take this very sophisticated bioreactor developed at Yolo and put it into what would be a commercial operating entity.

So we're in the process of identifying a landfill. We're looking very closely at San Bernardino. And that would both extend the landfill in terms of making it a commercial size facility, as well as simplifying its operation. So it's something that can be adopted widely throughout the state.

A lot of people have been talking about digester-type facilities. Again, these tend to be high capital cost, on the order of $4,000 a kilowatt. Also, because these are distributive generation type systems, by 2007 they have to meet the NOX emission requirements of the California Air Resources Board.

That's been a problem, because a lot of these types of facilities use reciprocating engines, which tend to have higher NOX emissions. So, in terms of the high capital costs we've done a fair amount of work in digesters.

We run the SP5X program, the dairy power production program, which is commercial technologies on dairies. And then we've released a targeted solicitation to really look at how do we improve conversion efficiencies and reduce costs.

One of the projects we're looking at is Valley Fig, which is going to be investigating above-ground types of reactors that would have a much higher conversion, and consequently, through simplified design approach a lower capital cost.

Flex Energy is a company that worked closely with Capstone, so it's a microturbine. But it's a microturbine that's been outfitted with a catalyst so that in fact it can burn very low BTU gases.

That's really important from both a digester and a landfill gas perspective because on a retrofit basis you've got landfills that haven't completed conversion of organic matter to methane,

so the methane that is being released is actually low concentration.

Similarly, with digesters you want to make certain that you have the capability to take into account any fluctuations in gas quality and seasonality of the gas. And you want to achieve very low NOX emission rates.

And Flex Energy does both of those. We've seen it operate on a prototype where it achieved less than one part per million on NOX emissions consistently over a pretty wide operating range.

We also are looking at how to reduce wildfires in California and reduce open field burning emissions. And we've been working with a very innovative firm, Community Power Corporation.

One of the biggest challenges in solid fuel combustion or gasification of solid biomass is that these things always look like the latest mousetrap. They're not something that you would want to put on a facility unless you were going to spend a lot of engineering time on it.

CPC has come up with a design that in fact looks very much like a Capstone-type approach. It has good load following, and again,

since we're talking about urban interface areas that are probably out at the end of the distribution line, these are going to have to have the capability to replace retail, or to do some load following.

And so this is the CPC unit. It's been tested by the Hoopa Valley Tribe up in northern California. Worked very successfully. We're now working with Department of Forestry for additional applications where it would be a joint project.

One of the biggest issues facing biomass power plants in California, somebody mentioned, the high cost of electricity generation. Well, one of the things you can do with solid fuel biomass power plants is try to increase the peaking capability.

Because again, peaking generation provides a lot of value to the grid. It's also something you can get more money for. TIAX, which was a spinoff of the Gas Technology Institute, developed a co-firing system which uses natural gas in combination with the solid fuel combuster, provides lower NOX emission rates, and provides very quick rampup at a very small incremental price.

It's been tested both at Fairhaven and at Burney Mountain Power, worked very well, and we would expect this technology to work out into the mainstream biomass power plants in the state relatively quickly.

I want to switch gears now and go away from direct methane and carbon dioxide, and talk about indirect. Because we've got a lot of research work going on in the ares of wind and solar.

And so if you look at wind in California right now, there's 1,700 megawatts of capacity. We know there's a huge wind potential in California. Some of the mapping that we've done, we're actually very surprised at just how huge the potential may be.

Back in the '80's some of the early mapping indicated maybe 30,000 megawatts of potential. We think that number is significantly much higher. Especially if you go up into these higher lines that we're looking at.

But the big issues with wind are the capacity value. And in fact we think there's a high capacity value for wind that's largely not recognized. Wind, in certain instances, will have

a high peaking value.

Reliability of wind. People are concerned about the intermittent nature of wind. I haven't talked about in this slide, I will towards the end though.

So we have two hardware development activities that we're involved in with wind. One is with the Wind Turbine Company. It's developed a very innovative two-bladed downwind wind turbine that -- the cost projection is that it would come in around three cents kilowatt hour. This was one of the advanced technologies that the Energy Commission worked with NREL and DOE on.

We had a very successful test at (inaudible). We did not have a very successful test at Fairmont Reservoir. We had a catastrophic failure. We think, at this point in time, that that catastrophic failure was not a design failure, but actually was a maintenance failure.

So we still think there's a high opportunity to move forward with this technology, but we're in a wait and see position right now.

Another firm that we're working with is Clipper Wind. And they're looking at a way to use -- up in the far right hand corner is a device

that would replace a standard gear box generator for a wind turbine.

Gear box problems with wind turbines are huge in California, they're actually huge across the country. It causes downage problems that tend to be very expensive, because it's very difficult to go up 100 feet, 200 feet in the air, grab the gear box, and bring it back down.

So you want to have high reliability. This company, Clipper Wind, has developed this distributive generator system that provides them with a wide operating range as well as a much higher degree of reliability. And that's currently under prototype testing.

I mentioned that there was something that I didn't show on here, and it deals with the intermittent nature of wind. We're working very closely with EPRI, Cal ISO, the California Wind Energy Collaborative, on wind forecasting and valuing wind, and how to integrate or evaluate the cost of integrating wind into California.

Those are really important if you want to see future development of wind. It can provide high benefit to the grid.

In the case of solar technologies, I'm

not talking about concentrating solar here. We do have some concentrating solar activities underway, with Solargenix as well as with some of the Stirling people.

But I did want to talk about some of the work going on with PV. Doug mentioned that -- he was hinting that -- PV has a very large potential in California. One of the biggest hurdles to PV development in California is the fact that putting a system up on a house you have to have the right configuration.

To date there's been very limited ways to put those on tops of commercial buildings or residential buildings. Home developers don't like a high profile. They don't like roof penetrations. And so we've worked very closely with SMUD and some other folks on developing different mounting techniques.

These are very successful approaches right now. We've had PowerLight Corporation, which started off as a very small firm, came into the Energy Commission, is now one of the fastest growing PV firms in the world.

We've worked closely with Uni-Solar. This is a standing scene roof. It's very easy to

apply. It comes in a roll that you literally roll out. Significantly reduces the amount of time to put PV on top of a roof.

Geothermal technologies. The single biggest barrier to geothermal development in the state, in California, is the high cost of exploration.

And some of the work that we have done on the PIER renewables side is with a company called EMI, who has developed a three-dimensional imaging tool that reduces the cost of figuring out where the geothermal resource is.

They've successfully tested this at Dixie Valley. We think that if this successfully goes into the next stage it could be significant enough to reduce geothermal exploration costs on the order of around 20, 30 percent.

And that's it, at least for the technologies I could talk about today.

MR. TUTT: Thank you, George. And Doug and Doug and Matt. Pierre. Interesting presentations here for the last item on the agenda, relating to really going beyond the RPS in reducing greenhouse gases in California with renewable energy.

We've listed some questions in the workshop notice and they relate very well to the presentations you've seen today. Reducing fuel costs at biomass power plants by looking at distributive generation and agriculture use of renewable energy. And also increasing the use of renewable energy by state and local governments.

Rather than read off these questions I'm just inviting people to come up, and if they have anything to say or comment or any questions about what we can do, please come to the microphone and provide your input. Gregg?

MR. MORRIS: Thanks. Gregg Morris of the Green Power Institute. And I just want to address fairly quickly the issue of this accelerated RPS, where we're looking at a potential locating the 20 percent renewables by 2010.

And in context with Doug's presentation which showed what we constructed as what we called our maximum renewable penetration scenario. And what Doug showed was something like 32 percent by 2017.

It just so happened that that also hit 21 or 22 percent, on its way to that 32 percent in

2017. And so if our assumptions were correct, and our analysis was correct, we did put together a scenario that would hit 20 percent by 2010. And it is what we consider to be the maximum rate of penetration for the renewables, looking at each renewable category.

And this was based on a logistic penetration study, which means that the logistic curve is sort of your typical S-shaped curve where you go up in an exponential growth pattern until you start hitting limits to market penetration, and it then tapers off until you hit the maximum market penetration that can be had.

And so this is a sort of study that is done outside of the constraints of worrying about little things like transmission constraints. It's really based on ultimate potential for the various renewables, and just basic growth rates of how things happen in the world.

Logistic curves have been successfully applied in a variety of areas, from population studies to penetration of new technologies into existing markets and so on. So, for what it's worth, 20 percent by 2010 is possible.

It's pushing every renewable to its

limit. But it's an interesting scenario.

CHAIRMAN BOYD: Gregg, was it predicated on today's technology, or were you presuming technological advances?

MR. MORRIS: Well again, the nice thing about a logistic market study is that you don't worry about that. You don't try and call which technologies within a resource category you're getting. You're letting the market take care of itself.

And what you're trying to do is see how fast you can push the resource itself, assuming that technologies do develop. And the develop as a function of the market penetration. The more units you build, the more learning you do, and therefore the better your technology becomes.

CHAIRMAN BOYD: Were you focused on an instate resource?

MR. MORRIS: Yes, oh yes, California only, yes.

CHAIRMAN BOYD: So you didn't presume any imports from elsewhere?

MR. MORRIS: That's correct. Those were all in the state of California.

CHAIRMAN KEESE: Can I follow up on

asking Doug a question? Doug Grandy. Recognizing the advancements we were successful in getting in DGS looking at energy efficiency activities and other options, and your last two years in this new role, were we to recommend major state activities in requiring renewables, do you think that would be met with positive reaction at General Services or other leadership?

MR. GRANDY: Well, I'm sure that General Services stands ready to respond to a request. These are interesting times in state government, as I'm sure you know. And the toll has been taken in General Services as well, and I could give you a very definitive answer once there's a budget, and we see what the affect is at it tumbles down.

Depending on how that comes out, there could be massive carnage in the department. And one of the features of my group that I left behind is that it's not a mandated function of government.

It was entrepreneurial, and operated as a fee-for-service self-supporting agency. And in plain English translation, it's expendable in today's environment.

So, barring any more of those kinds of

calamities, I'm sure the department would be more than happy -- and I should mention that the Power Authority is certainly positioning itself, as you well know, to pick up a lot of that development drive that I spoke of. And hopefully, you know, we all wish them the best of success in their endeavors.

CHAIRMAN KEESE: Well, clearly we have policy drivers, as I mentioned earlier. We have the governor first just setting forth a plan to get to the 20 percent. And then we have the legislature adopting it and setting forth the plan.

And now we have a collaborative between the PUC and Energy Commission to use the renewable funds and their activities to get there. Another road is to have the state take -- I'll just pick on one -- and that's directly purchase renewables or install photovoltaics on more buildings, or activities like that.

And I gather the fact that you've been looking at it in an official capacity means that that may be a fertile field. We're not heading into a brick wall if we decide to recommend something in that area.

MR. GRANDY: On the path of directly purchasing renewables, I believe the bottleneck is not General Services. Once the project gets there, it'll get done as quickly as it can get done.

The bottleneck is clearly upstream in getting projects like that funded amidst all the other competition for hard dollars.

CHAIRMAN KEESE: Thank you.

MS. TURNBULL: Jane Turnbull again. And I'm not sure whether I'm speaking for the League of Women Voters or my alter ego, so I'm -- because the presentations really brought me back to previous lives that I have been in and have been very involved in.

Biomass has been the area that I have worked in most significantly over the last 10 to 15 years. And I appreciated both the Forestry presentation and also Matt Summers agricultural presentation.

And I think one of the first points I'd like to make is it's important for people to understand that wood waste is different than agricultural waste, and people tend to lump biomass into one category.

And each substrate or feedstock is unique and the way that it needs to be treated is unique, and the technologies that are appropriate are unique.

Secondly, in terms of how they are going to fit into the greenhouse gas mitigation scheme is also going to be very specific. Certainly, reduction in wildfires is an important concern. But when you're dealing with what's going to landfills right now, such as food processing waste and green waste, you have a whole other life cycle assessment to look at there.

And the opportunities to mitigate the emissions from fertilizer production are not something that are negligible. Actually, this could be very significant. And the digestate from digester materials is very high in nitrogen, and is a very suitable soil amendment.

Actually it is almost perhaps a direct substitute for fertilizer. And considering the amount of natural gas that goes into the production of fertilizer, the opportunity for a greenhouse gas emission there is very notable.

I also would like to make a point that, having the PIER program in the CEC, under the

auspices of the CEC, is a very real advantage toward perhaps realizing the 2010 accelerated goals of renewables. The concerns about small modular biomass have been around for abut 15 years.

Bob Williams, who was a McArthur Fellow and a very brilliant professor at Princeton, came out with the division of the integrated gasification combined cycle biomass system. And he sold this to the world.

Sweden bought it, and Great Britain bought it, and our Department of Energy bought it. And they have put literally hundreds of millions of dollars into integrative gasification combined cycle facilities. And I don't believe any of them are operating at this point in time.

It's really been tragic. And the point that I'm trying to make is that it didn't have to be this way if people looked at this in a phase kind of process, and looked at what the problems were, and addressed the research components of the problems along the way, which would have been far less expensive.

And the hundreds of millions of dollars that went into these projects might have well been

saved. So I think there are some concerns. The Community Power Corporation project is probably a very good one because they did it at Hoopa first, where they didn't try to generate power. They were simply doing a thermal system.

And that's probably a better way to go for any one of these systems and do it in a phased kind of mode, and then add the more sophisticated challenges incrementally.

The World Bank did not do that. They also put hundreds of millions of dollars out into gasification technologies that are around the world in developing countries rusting all over the place, because they were far too sophisticated for what the technology was at that point in time.

There are a lot of companies out there that have good PR, and they have good concepts, but they haven't validated those concepts.

Several years ago, when I was working at EPRI, we worked with Bechtel and looked at all these small modular biomass systems that were on the market, and I think we looked at 110 of them.

Out of 110 we felt that three were perhaps really viable. The rest were all on the Internet and they had good websites and lots of

promises.

But it really is, you know, a cautionary -- I'd like to make it a cautionary concern that what we read in the newspaper is not always what is so.

Again, I think these things can be done in a phased mode, and the opportunity to utilize the research program as part of the whole is something I think is worth incorporating. And I wish you well on the 2010 date.

CHAIRMAN BOYD: Thank you. I -- personally, that's very sage advice. And I wish some people had followed it when they designed the electrical system here a few years back. But anyway, that's a good point. Thank you, Jane.

MR. ROMANOWITZ: Hal Romanowitz again. I know you're obviously struggling with ways to try and break the mold and create a more rapid penetration rate, and one suggestion of something you could look at that would be a recommendation that I think you could do and could have a moving effect would be the ultraclean or renewable fulfillment of direct access and departing load issues.

That by removing all of the restrictions

and cost impacts that have been placed on departing load in particular and direct access as a second step.

By removing those and allowing renewable energy, or ultraclean energy, to fulfill and go into those markets without the substantial penalties that are put on them now because of the Department of Water Resource charges, that would be a way to essentially start breaking -- give that market a way to break open.

And if you did it on the basis of 100 percent renewable, 100 percent clean, then you're setting a standard that really allows the renewables to fulfill higher penetration levels as time goes on. And I think you'd find a mold-breaker using that approach.

CHAIRMAN BOYD: I take it you don't think the CPUC decision on departing load went far enough?

MR. ROMANOWITZ: It helps materially. And I am looking and working at it now. It appears that it does help some situations but it doesn't go far enough to really do as much as could and probably should be done to break the market open, right.

CHAIRMAN BOYD: And what are the principle areas that you find deficient there? Is it the size limit?

MR. ROMANOWITZ: Well, yes, the size limit -- and I don't believe there's a size limit on it now. I believe there's at least one option where there's not a size limit, but there still are some relatively significant back charges to pick up.

And secondly, if somebody was a direct access customer, and then shifts to departing load, he's got a tremendous get, and it makes it just not feasible. And that type of a customer is the one that is most receptive to taking the risk of doing that sort of thing.

And it's probably not that big a thing to the overall effect of paying off the back charges, but it sure could be a breaker to open up a market where you have a number of the other potential purchasers with the utilities reluctant to move quickly.

When you break the market open to let somebody who really wants to do it do it, I think it could shift the whole market open.

CHAIRMAN BOYD: The direct access area

is one that the legislature has reserved for itself in terms of determining when that is reopened. And the PUC decision was in fact confined to departing load.

MR. ROMANOWITZ: Right.

CHAIRMAN BOYD: I understand what your point is better.

MR. ROMANOWITZ: Okay.

CHAIRMAN KEESE: We fully understand. We have a yoke, and it's not just around developing renewables, it's a yoke around everybody's neck that is going to influence the system for the next ten years at least. So, --

MR. ROMANOWITZ: Yes, I realize -- and again, when you look at it, is that yoke something that can be twisted a bit enough to make it break. I think it's an area that has more potential and probably can be worked if the rules are carefully tailored.

CHAIRMAN KEESE: Correct. Depending on which half -- one half of one percent of the market, or one percent of the market we care to benefit.

And it could be, and some people would argue that that should be agriculture, and some

people would argue that it should be the renewable industry, and some people would advocate that it should go to the industrial segment so that we don't lose it in California, and --.

MR. ROMANOWITZ: You might find if you do it that you get some breaks. But the point being that the renewables were not a part of the mix that could compete for the problem. they really could not compete for the DWR overpurchases.

So that, in a way it's very unfair to penalize renewables for ten years. And I think that there are equities where if you look at it and manage it reasonably you might be able to break it open.

CHAIRMAN BOYD: I'm afraid many of us now recognize the chilling effect that that yoke has had on a lot of the possibilities, but it's something that we all need to continue to talk about.

The trouble is to move it is to move it to some other accounting column, and put the debt someplace else. But it's probably something that's worth talking about in terms of what is chilling and what the developmental possibilities

we're losing.

CHAIRMAN KEESE: Yes, and if you're speaking of it in increments, I think the PUC action was positive.

MR. ROMANOWITZ: Definitely. it was certainly a positive step. and it says that there is something that can be done. And the question is is there a way to revisit it and --

CHAIRMAN KEESE: Next year we can revisit it.

MR. ROMANOWITZ: Okay.

MR. TUTT: Tom?

MR. TANTON: Thank you. One very brief comment that I hope the Commission does not lose sight of. It affects the accelerated scenario probably more than the regular scenario, whatever that is.

But what I hope you don't lose sight of is the need for support infrastructure. Trained installers, people that understand how to operate these things.

I know the Commission has some programs in that area in conjunction with other folks. But that is crucial. That we don't get a new surge of renewables and then falls flat on its face because

of the lack of support infrastructure.

MR. TUTT: Thank you. Any other comment?

CHAIRMAN BOYD: I think you've hit the end of the road.

MR. TUTT: I think so. I'd like to thank everyone for coming in. I'd like to make one slight announcement, and that is we included a date for public written comment in this workshop notice of June 20th, last Friday.

It was primarily because we need to get this preliminary renewable resource assessment, which was the topic of this morning, to the PUC by July 1st. So there's very little time to incorporate comments on that report.

On the Renewable Resource Development Report, the PIES Report, and the global climate change part of the Integrated Energy Policy Report there is additional development work going on for the next few months.

I'd like to suggest you'll have plenty of opportunity to comment. But if you have written comments that you would like to address to the topics of this afternoon, if you could get them to us by July 7th we probably can use them

for the Public Interest Energy Strategies Report and moving forward on the Integrated Energy Policy Report.

CHAIRMAN BOYD: Speaking for the three of us, I hope, I would like to thank the audience and the staff for a job well done today, and a really interesting discussion. Thank you.

CHAIRMAN KEESE: Yes, and I -- as you know, we're going to come up with our recommendations to the governor to establish state policy. If this is fed -- consider this as input to you.

If you can come up with recommendations you think we should make, fell free to do it over the next couple of weeks. We will be recommending a hundred policy issues, probably, to the governor.

You'll get a crack at them too, because we're going to put them out in public so you can comment on what we come up with. But we sure can use help in figuring out what those recommendations should be. Thank you.

MR. TUTT: Thank you.

(Thereupon, at 3:38 p.m. the workshop was adjourned.)

CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 8th day of July, 2003.